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A CONFIRMATORY FACTOR ANALYSIS OF THE 22-ITEM EMPATHY ASSESSMENT INDEX

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A CONFIRMATORY FACTOR ANALYSIS OF THE 22-ITEM EMPATHY ASSESSMENT INDEX

By

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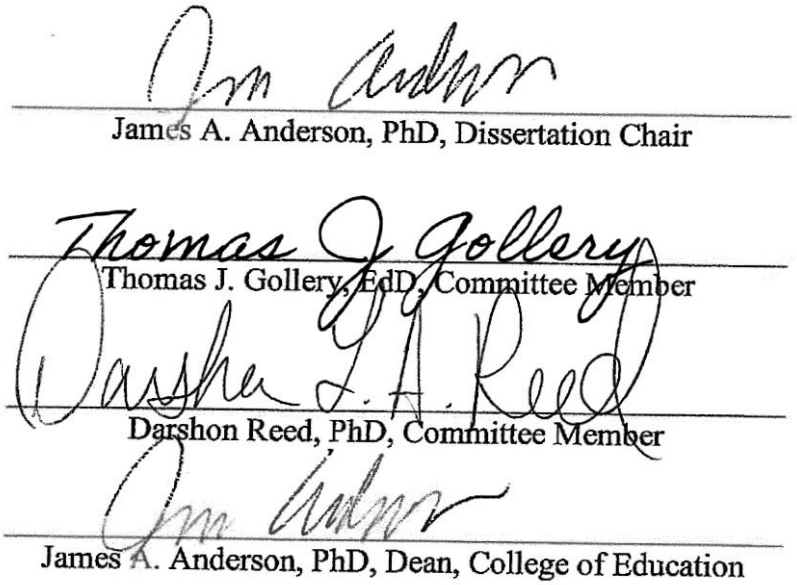
Dissertation Approved:



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DEDICATION

I dedicate this dissertation to my four children, Elizabeth Anne, Abilene Rose, John Robert, and Joshua Christian and to my grandchildren, Ryan, Jacen, Emmy, Clara, Jayden, and Lilah. My love for them motivated me to seek an understanding of empathy.

I also dedicate this dissertation to my Lord and Savior, Jesus Christ. In Him I live, and move, and have my being. Jesus was instrumental in bringing me to Southeastern University, and He alone is responsible for granting me the intelligence and skills necessary to accomplish this degree. Truly, without Jesus, I can do nothing.

I pray that God will increase my empathy for those who are like me, for those who are most unlike me, and for everyone in between. May God grant me eyes to see as He sees, ears to hear as He hears, wisdom to understand as He understands, and a heart to love as He loves.

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Abstract

The Empathy Assessment Index (EAI), an instrument based on the social cognitive neuroscience conceptualization of empathy, is a measure of interpersonal empathy with five components: affective response, self-other awareness, perspective taking, affective mentalizing, and emotion regulation. However, the most recently added component, affective mentalizing, has demonstrated high correlations with perspective taking. The high correlations may indicate a lack of discriminant validity within the index. This non-experimental, quantitative, and cross-sectional study aimed to determine whether the factor structure of the 22-Item EAI is a correlated five-component model. A snowball sample of 929 community members completed the 22-Item EAI as an online survey housed in SurveyMonkey. The hypothesized five-component model was examined with a confirmatory factor analysis in a random subsample (n = 300) of the valid dataset (N = 903). Findings indicated that a five correlated model of the 22-Item EAI had inadequate or poor model fit: $\chi^2(199) = 605.41$; NC = 3.04; RMSEA = .08 [.08, .09]; CFI = .80; TLI = .77; SRMR = 0.08. The findings suggest that additional research is needed to establish the underlying factor structure of the 22-Item EAI. Future studies should include exploratory factor analysis and confirmatory factor analysis to determine the best model fit of the index. The results of studies that have used the 22-Item EAI as a five-component model should be interpreted with caution.

Keywords: Empathy Assessment Index, empathy, confirmatory factor analysis, affective mentalizing, perspective taking, measurement

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I. INTRODUCTION

Empathy, a biological, psychological, and social process (Gerdes et al., 2011; Segal et al., 2017), is the ability to feel and to understand the emotions of another person and to understand another person's experience from that person's perspective (Segal et al., 2013). Empathic individuals are those who "can identify and understand situations, feelings, motives, and perspectives, and moreover, recognize and appreciate concerns of another person" (Ratka, 2018, p. 1140). Empathy is a key element in all successful human interactions, and the benefits of empathy are numerous. Interpersonal empathy leads to better social interactions, more respectful work relationships, productive collaboration, reduced compassion burn-out, a more civil society, and improved civil discourse (Segal et al., 2012; Suttie, 2019; Wagaman et al., 2015).

Although readily acknowledged as an important quality in practitioners in the clinical settings of health care, social work, and counseling, empathy is also "the most important human attribute that matters in every aspect of life" (Ratka, 2018, p. 1140) and in every setting that involves social interaction. Segal et al. (2012) identified the association of a lack of interpersonal empathy with "narcissism, bullying, violent crime, abusive parenting, spousal battering, and sexual offending" (p. 542). Additionally, Segal et al. noted that the lack of empathy may lead to the dehumanizing treatment of marginalized groups, which results in racism, sexism, and homophobia.

Individuals with higher levels of empathy recognize the humanness of others irrespective

of differences. Empathy is the foundational attribute necessary to express social empathy, which is "the ability to more deeply understand people by perceiving or experiencing their life situations and as a result gain insight into structural inequalities and disparities" (Segal, 2011, p. 266). Empathy improves collaboration amongst diverse populations, develops a sense of belonging to a community, fosters cultural inclusiveness, honors the richness of diverse cultural perspectives, and increases positive interactions with people who have different perspectives (Berman, 2018; Segal et al., 2012). In short, empathy may be the key trait that can reduce prejudice and facilitate social justice.

Research has demonstrated that individuals of any age can increase their empathy levels (Ratka, 2018). Data from several studies focusing on training programs specifically targeting the development of empathy in adults have documented increased empathy levels in participants after training sessions (Levett-Jones et al., 2019; Sentas et al., 2018; Shelton & D'nn Lovell, 2019; Wellbery et al., 2019). Researchers, educators, and practitioners in all fields and disciplines need access to reliable and valid empathy measures to assess individuals' empathy levels. Accordingly, valid and reliable empathy measures are necessary tools to assess participants' pre- and post-intervention empathy levels.

A team of social work researchers constructed a self-report measure of empathy, the Empathy Assessment Index (EAI; Segal et al., 2017), based on empirical evidence of the distinct neural pathways underpinning the empathic process. The EAI may meet the needs of practitioners, educators, and researchers who desire to measure the levels of empathy and the individual components of empathy in adults using a concise self-report instrument. However, the factor structure of the 22-Item EAI with five components does not appear to have been confirmed with confirmatory factor analysis (CFA) after the team of researchers constructing the

instrument revised the instrument. Additionally, a limitation of the validation studies of the EAI is that the convenience sampling method employed by the constructors of the EAI "over represented [*sic*] the perspectives of undergraduate students" (Lietz et al., 2011, p. 117). The purpose of the study was to confirm the factor structure of the 22-Item EAI in a diverse sample of adults.

Background of the Study

Researchers have studied empathy using behavioral measures, neuroscientific measures, and self-report measures (Neumann et al., 2015). Researchers often use behavioral measures in conjunction with neuroscientific measures such as brain imaging techniques and central nervous system activity measures to view brain activity in response to empathy-triggering stimuli, such as videos, photographs, or verbal cues to empathize, in experimental settings (Neumann et al., 2015). Neuroscientific studies have provided empirical evidence of the complex nature of the empathic process. The studies have been instrumental in the ability of researchers to map the underlying neural pathways that instantiate one individual's (i.e., the observer's) empathic response toward another individual (i.e., target). Researchers who use behavioral methods and neuroscientific measures are highly skilled evaluators. The technical methods necessary to conduct the studies are expensive and require time-consuming testing protocols and specialized equipment (Neumann et al., 2015). Consequently, behavioral methods and neuroscientific techniques are not readily available to most researchers, educators, and practitioners. Additionally, although neuroscientific measures of empathy enable researchers to map the underlying brain structures involved in the empathic process, these measures cannot provide information about empathy levels nor its individual components in individuals (Neumann et al., 2015).

Self-report measures of empathy, by contrast, are measures of the levels of empathy in individuals (Neumann et al., 2015) and are accessible to most researchers and practitioners. Accordingly, the most widely used method to measure empathy is the self-report instrument, which researchers had used in 88.5% of empathy studies involving adults from 2000 to 2015 (Ilgunaite et al., 2017). However, self-report instruments have limitations. First, individuals are often poor evaluators of their own empathic skills and, second, responders are prone to respond according to their perceptions of social desirability (Ilgunaite et al., 2017). Nevertheless, self-report instruments are easy to use and can produce reliable and valid results; moreover, no specialized training or equipment is necessary to use the instruments, enabling researchers and practitioners to analyze the data from the instruments quickly (Ilgunaite et al., 2017).

According to Ilgunaite et al. (2017), the most often used self-report instrument in reported studies of empathy in adults between 2000 and 2015 was the Interpersonal Reactivity Index (IRI; Davis, 1980, 1983). The IRI was the first instrument to incorporate a multidimensional conceptualization of empathy (Lanzoni, 2018). Before the IRI, researchers conceptualized empathy as a unidimensional construct and measured empathy as either an affective response or as the cognitive process of perspective taking (Neumann et al., 2015). The IRI, conversely, measured two components of empathy—affective empathy and cognitive empathy—using four subscales:

- perspective taking (sample item, “I sometimes try to understand my friends better by imagining how things look from their perspective”; Davis, 1983, p. 117),
- personal distress (sample item, “Being in a tense emotional situation scares me”; Davis, 1983, p. 117),
- fantasy (sample item, “I really get involved with the feelings of the characters in a

novel"; Davis, 1983, p. 117), and

- empathic concern (sample item, "I often have tender, concerned feelings for people less fortunate than me"; Davis, 1983, p. 117).

Researchers have used the IRI extensively during the last four decades in studies to assess the convergent and concurrent validity of other instruments and in studies employing behavioral methods or neuroscientific methods (Neumann et al., 2015). However, reviews of the IRI in the last two decades suggest that the subscales of empathic concern and personal distress conflate empathy with sympathy and emotion contagion, which are related but different constructs (Gerdes et al., 2011; Jolliffe & Farrington, 2006; Spreng et al., 2009; Vachon & Lynam, 2015).

Although a consensus on the exact definition or conceptualization of empathy remains elusive (Innamorati et al., 2019), researchers generally consider empathy to be the capacity for an observer to feel what a target is feeling and to understand why the target feels that way in an emotion-inducing situation (Segal et al., 2017). To better define, conceptualize, and measure empathy, researchers have developed multiple self-report measures of empathy during the last two decades.

One group of researchers in the field of social work from Arizona State University in Phoenix integrated recent findings from the nascent, interdisciplinary field of social cognitive neuroscience (SCN) in their conceptualization of a multidimensional model of empathy. Based on the SCN conceptualization, the researchers constructed and validated the EAI during three independent studies: a pilot study in a sample of undergraduates (Gerdes et al., 2011), an exploratory factor analysis (EFA) and a CFA study in a sample of undergraduate students and community members after revisions were made to the pilot version of the EAI (Lietz et al., 2011), and a known-groups validity study utilizing a sample of social service providers and their

service recipients (Segal et al., 2017). The three studies are thoroughly described in Chapter 2.

Based on the results of a differential item functioning analysis using data from the known-groups study, Gerdes and her colleagues (2012) revised the affective response component to improve the specificity of perception-action items and added four items to measure a fifth component, affective mentalizing. The version of the EAI constructed after the known-groups study comprises 22 items that measure interpersonal empathy according to a five-component model: (a) affective response, (b) self-other awareness, (c) perspective taking, (c) affective mentalizing, and (d) emotion regulation (Segal et al., 2017). Although Gerdes et al. (2012) reported plans to administer the revised EAI in an independent sample and conduct a "confirmatory factor analysis to test the model fit with the new affective mentalizing component of the EAI" (p. 108), no results of a CFA study were found in the literature, and the psychometric properties of the components of the 22-Item EAI are unknown.

Conceptual Framework

No single definition or conceptualization of empathy exists across disciplines. Still, most conceptualizations of empathy include at least two dimensions of empathy: "an inductive affective (feeling) and cognitive evaluative (knowing) process that allows the individual to vicariously experience the feelings and understand the given situation of another" (Neumann et al., 2015, p. 257). Researchers in the emerging field of SCN, "an interdisciplinary field that studies, primarily with neuroimaging techniques, the way social emotions and human interactions are instantiated in the brain" (Gerdes et al., 2012, p. 94), have contributed to the conceptualization of empathy by identifying brain mechanisms underlying empathy. Since the beginning of the 21st century, neuroscientists such as Jean Decety, Phillip Jackson, and Claus Lamm (Decety, 2010; Decety & Jackson, 2004, 2006; Decety & Lamm, 2006; Lamm et al.,

2019) have used advances in brain imaging techniques to chart "the neural mechanisms of empathy" (Lanzoni, 2018, p. 252). According to Segal et al. (2017), empirical evidence from brain imaging studies (e.g., Decety & Jackson, 2004, 2006; Lamm et al., 2019) supports a multidimensional, multi-faceted conceptualization that accounts for the various processes involved in the experience of empathy.

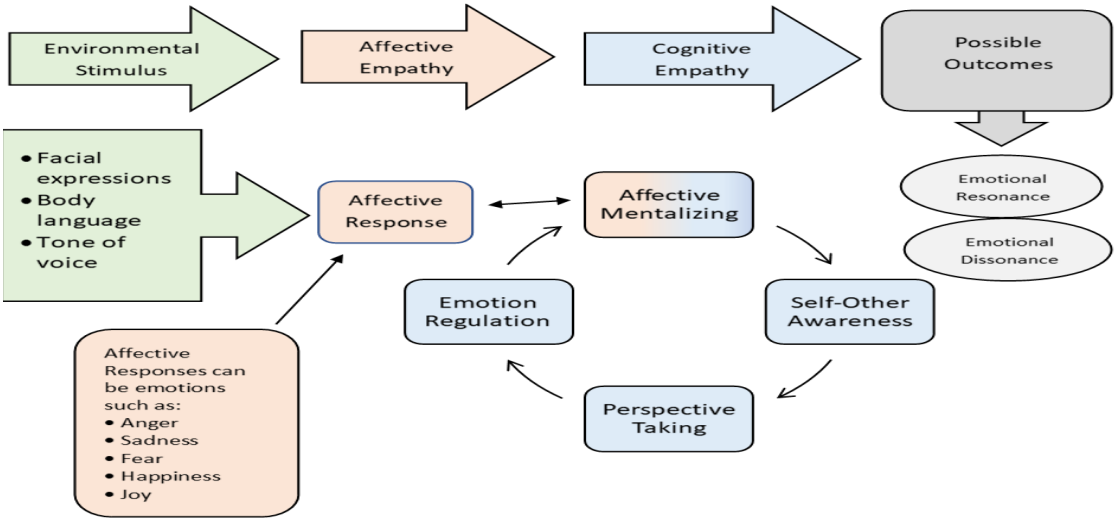
The team of researchers who constructed the EAI defined the components (i.e., the latent variables) and constructed novel items (i.e., the observed variables) to measure the construct of empathy based on an SCN conceptualization of empathy (Segal et al., 2017). The SCN conceptualization identified three functional mechanisms involved in the experience of empathy: affective sharing, self-other awareness, and mental flexibility (Decety & Jackson, 2004, 2006; Decety & Moriguchi, 2007). Four neurological processes are involved in the processing of emotional information: affective sharing, self-awareness, mental flexibility, and emotion regulation (Decety & Moriguchi, 2007). Segal et al.'s (2017) operationalization of the SCN conceptualization of empathy has five components: affective response (i.e., affective sharing), self-other awareness (i.e., self-awareness), perspective taking and affective mentalizing (i.e., mental flexibility), and emotion regulation. An observer must engage all five components of empathy to experience emotional resonance and empathic accuracy to empathize with the target. The five components are associated with two aspects of empathy: affective empathy and cognitive empathy. Affective empathy involves the sharing of emotions. Cognitive empathy involves understanding the emotional state of a target and regulating the emotional experience of empathy.

Although the discussion of empathy considers each component separately, empathy is not a linear process; instead, the "processes involve different parts of the brain, some overlapping,

some sequential, some sometimes stronger at one time than another" (Segal et al., 2017, p. 20). If any of the five components are absent or weak, emotional dissonance, such as emotion contagion or personal distress, will result rather than empathy. Figure 1 illustrates the relationship of each component of interpersonal empathy.

Figure 1

An SCN Conceptualization of Interpersonal Empathy



Note: Adapted from *Assessing Empathy* by E. Segal, K. E. Gerdes, C. Lietz, A. Wagaman, and J. Geiger, 2017, p. 16, Columbia University Press.

The processes involved in the SCN conceptualization of empathy may be understood according to the following narrative. A co-worker (the observer) noticed a colleague's (target) smile and excited tone of voice. The observer automatically experienced a positive emotion (affective response), felt a sense of happiness, and began to process the felt emotion, knowing that the felt sense of happiness originated in the target as a result of the target's experience (self-other awareness). An affective response also could have been caused without environmental triggers if the observer had been told about the colleague's promotion and imagined the

emotional state of a target (affective mentalizing). The observer's effort to understand the reasons for the target's feeling of happiness involved perspective taking and affective mentalizing. In response to the observer's inquiry, the colleague announced that she received a promotion, which the observer also had desired. To continue experiencing empathy, the observer would need to suppress (emotion regulation) a personal sense of disappointment to imagine what the promotion meant for the target's family (perspective taking). The result of empathizing with the target would be the observer's experience of a positive emotional state congruent with the target's emotional state (emotional resonance).

Yet, the experience of empathy is not an automatic experience. If the observer did not notice the target's emotional cues (i.e., environmental stimulus of the smile and the tone of voice), an affective response would not have been generated and the cognitive processing of the affective response would not have been initiated. However, if the observer did experience an affective response but had poor cognitive empathy skills (i.e., affective mentalizing, self-other awareness, perspective taking, and emotion regulation) or if the observer chose not to engage in the cognitive processing of the felt emotion, the observer would not experience empathy with the target. For example, if the observer had poor emotion regulation skills and became fixated on the personal disappointment of not receiving a desired promotion, the observer might disengage from the processing of the affective response and thus, empathy, which would result in emotional dissonance rather than emotional resonance.

Affective Response

The affective response component, the only affective empathy component in the EAI, denotes the innate and involuntary responses that an observer experiences when an external emotion stimulus, such as a target's facial expression, body language, touch, or tone of voice,

triggers a similar emotional response, or representation, in the observer's mind (Segal et al., 2017). A target's positive emotions (e.g., happiness, joy, excitement) and distressing emotions (e.g., anger, grief, fear, disgust) can trigger an observer's emotional response. According to the SCN conceptualization of empathy, the response occurs because of the activation of the perception-action coupling mechanism (de Waal & Preston, 2017), which underlies the shared representations of behaviors and emotions. When the observer perceives an expressed emotion (i.e., an action) in a target, the observer's brain creates a representation of the emotion (i.e., action) and experiences (i.e., perceives) the emotion as if it originated within the self (Decety & Jackson, 2004, 2006; Decety & Lamm, 2006; de Waal & Preston, 2017). The processes involved in the perception-action coupling mechanism do not occur in a single region of the brain; rather, a complex network of neurons present throughout the brain are activated. The perception-action coupling mechanism facilitates the bottom-up processing and top-down processing of information, including information related to the experience of emotions (de Waal & Preston, 2017).

Self-Other Awareness

Self-other awareness, or self-other differentiation, is an observer's ability to recognize that the target's emotional state is the source of the felt emotion or affective response (Segal et al., 2017). Self-other awareness is a component of cognitive empathy and occurs through the top-down processing of information (de Waal & Preston, 2017). Self-other awareness protects the observer from becoming overwhelmed by the target's emotions, a state called personal distress, and unconscious mimicry of the other person's emotion or emotion contagion (Segal et al., 2017). Personal distress and emotion contagion are not elements of empathy (Decety & Jackson, 2006); rather, they are indicators of emotional dissonance. Differentiating between the emotions

of the self and the other when processing an affective response is a fundamental skill necessary to engage successfully in perspective taking, which is also a component of cognitive empathy.

Perspective Taking

Perspective taking is the skill that enables individuals to "intentionally adapt the subjective perspective of others by putting themselves into other people's shoes and imagining what they feel" (Decety & Jackson, 2006, p. 55). Perspective taking that fosters empathy requires an observer to view an experience according to how the target experiences a situation rather than how the observer would feel in the situation. Perspective taking that enables empathy entails an observer having self-other awareness to prevent a self-oriented perspective rather than an other-oriented perspective of a situation. In short, empathy requires the observer to view a situation from the target's point of view (Segal et al., 2017).

Affective Mentalizing

Affective mentalizing is the "capacity for the imaginative transposing of oneself into the feeling and thinking of another" (Decety & Jackson, 2006, p. 54) and is the process that enables an observer to infer the emotional state of a target without external stimuli of emotional cues (Segal et al., 2017). Affective mentalizing can initiate an affective response when an observer imagines a target's emotional state upon hearing about the target's experience. Considering that affective mentalizing engages both the cognitive processing of emotional states and the activation of affective response, Segal et al. (2017) conceptualized affective mentalizing as a bridge between affective empathy and cognitive empathy.

Emotion Regulation

Segal et al. (2017) described emotion regulation as the capacity of a person to maintain emotional balance when vicariously processing an emotional experience triggered by a target's

emotional state. Emotion regulation, according to Segal et al., facilitates the observer's ability to make meaning of the affective response and the target's emotional state without becoming overwhelmed by the target's emotions or focusing on personal emotions. Emotion regulation, an essential skill, supports the cognitive processes of affective mentalizing, self-other awareness, and perspective taking**.**

Problem Statement

The validation studies of the EAI conducted by the Arizona State University researchers have limitations. Lietz et al. (2011) stated in the CFA study of the 17-item, five-component version of the EAI that the "focus groups may have overemphasized the social work perspective" (p. 117) and that the sample may have "over represented [*sic*] the perspectives of undergraduate students" (p. 117). Segal et al. (2012) remarked that the sample used in an EFA study of the Social Empathy Index, which included a 20-item, four-factor version of the EAI, demonstrated "apparent homogeneity, which may be due to the sample having been drawn from social work education courses" (p. 554). Lastly, Segal et al. (2013) theorized that moderating variables, such as age, may "affect the extent and intensity of a person's subjective experience of empathy" (p. 147). Gerdes et al. (2012) acknowledged that the EAI, as a new instrument, must undergo further testing to accumulate "evidence over time to instill confidence in findings" (p. 108) when the instrument is used in studies in which empathy is a variable.

The EAI has been used to measure empathy primarily in samples of university students or in samples of adults within a clinical setting but has not been used to measure empathy in a diverse sample of adults within the general population. Scarce evidence exists for the use of the instrument in the general population. Researchers need to obtain data from the use of the 22-Item EAI in a diverse sample of adults from the general population to ascertain the instrument's

generalizability in populations that differ from the samples used in the validation studies of the EAI. Furthermore, no evidence of a CFA of the 22-Item EAI was found in the literature. A CFA to assess the model fit of the 22-item, five-component version of the EAI should be conducted to provide evidence to instill confidence in the findings from the instrument's use.

Purpose Statement

The purpose of the study was to conduct a CFA using data from a diverse community sample of adults to determine if the factor structure of the 22-Item EAI is a correlated five-component model as proposed by the instrument's developers.

Research Question

The following research question was addressed in the study:

Is the structure of the 22-Item EAI a correlated five-component model as proposed by the instrument's developers?

Hypothesis

H_a: The factor structure of the 22-Item EAI is not a five-component model.

Overview of Methodology

Research Design

The research method of the study was quantitative, non-experimental, and confirmatory. The research approach incorporated a cross-sectional survey design (Edmonds & Kennedy, 2017) using a diverse sample of adults within the general population to examine the measurement model of the 22-Item EAI, which Segal et al. (2017) presented as a five-component correlated model.

Data Collection

Sample Recruitment

After approval from the Institutional Review Board of Southeastern University was obtained, adults from the general population were invited to respond to an online survey consisting of an online consent form, the 22-Item EAI, and nine demographic items (See Appendix A) using a snowball sampling technique. According to Chopik et al. (2017), samples obtained through Internet-based sampling methods "can provide useful and valid data for psychological research" (p. 27) and are "more diverse than traditional undergraduate samples" (p. 27).

Instrumentation

The online survey questionnaire entitled "A Human Relations Survey" comprised two parts: nine demographic items and the 22-Item EAI. The 22-Item EAI was presented before the demographic items in the questionnaire. Details of the 22-Item EAI (i.e., its components, the number of items and sample items for each component, and the reliability and validity of the instrument) are presented in Chapter 3.

Overview of Analyses

Responses to the EAI items and demographic items were entered in an Excel spreadsheet and cleaned. Likert-scale responses were treated as continuous data (Tabachnick & Fidell, 2019). Before the findings relative to the study's formally posed research question were analyzed, preliminary analyses (i.e., descriptive statistics of essential demographic information) and an evaluation of the assumptions of normality (i.e., screening for missing data, univariate and multivariate outliers, univariate and multivariate skewness and kurtosis, and multicollinearity and singularity) were conducted using SPSS version 27. Then, a CFA using Stata version 16

following Tabachnick and Fidell's (2019) five-step analysis process was conducted using data from a subsample (n = 300) to address the research question. The results of all analyses have been reported in Chapter 4 and discussed in Chapter 5.

Definition of Key Terms

The following words and phrases are key terms for the study.

- **affective empathy**: emotional empathy (de Waal & Preston, 2017); experiencing an affective reaction according to the emotional experience of another person (Shamay-Tsoory, 2009)
- **affective mentalizing**: the act of creating a mental image of an emotional event of another person and experiencing an emotional response as if the event were happening to the self (Segal et al., 2013); considered a bridge between the unconscious affective response and the beginning of the cognitive processing of the emotional state of another person (Segal et al., 2017)
- **affective response**: an unconscious, automatic, and involuntary emotional reaction (positive and negative emotions and sensing pain) in an observer in response to the emotional expression or expression of pain in a target (Segal et al., 2013); an affective response may be triggered by external stimuli, such as a target's facial expression, body posture, or voice inflection; can also be triggered through affective mentalizing; initiates bottom-up processing (de Waal & Preston, 2017)
- **cognitive empathy**: the conscious processing of affective response to make meaning of another person's emotional state Segal et al., 2013; involves top-down processing (de Waal & Preston, 2017
- **emotion regulation**: the ability to regulate one's own emotions when experiencing a

target's emotional state (Segal et al., 2013)

- **interpersonal empathy**: the ability to understand what another person is feeling and thinking (Segal et al., 2012) and to share the feelings and to imagine being in another person's place (Segal et al., 2017)
- **perspective taking**: "the ability to cognitively process what it might be like to experience the experiences of another, or 'stepping into the shoes of another'" (Segal et al., 2013, p. 133)
- **self-other awareness**: the ability to differentiate one's own experiences and emotional state from a target's experiences and emotional state (Segal et al., 2013)

Significance

The 22-Item EAI is a recently published self-report measure of interpersonal empathy that has been used in samples of university students or clinical settings but not in samples from the general population. The EAI with 22 items and the affective mentalizing component appears never to have been analyzed with a CFA to confirm the proposed five-component model. The 22-Item EAI has not been used to measure interpersonal empathy in a diverse sample of adults. The results of the CFA study contribute to the current understanding of the measurement of empathy by extending the literature with data from the evaluation of the factor structure of the 22-Item EAI. Evidence of inadequate or poor model fit of the 22-Item EAI in the study's sample of adults may indicate the model is mis-specified and that the factor structure of the index needs further research. The results from the study lay the groundwork for future research on the model structure of the EAI.

II. REVIEW OF LITERATURE

Empathy is related to altruism (Batson et al., 2015), moral reasoning (Dahl & Killen, 2018; Decety & Cowell, 2014; Grief & Hogan, 1973), prosocial behavior (Cartabuke et al., 2019; Innamorati et al., 2019; Neumann et al., 2015; Segal et al., 2017), and meaningful relationships (Batchelder et al., 2017). Empathy deficits are associated with aggression (Jolliffe & Farrington, 2004; Vachon & Lynam, 2015; van Langen et al., 2014), victimizing behavior (Haddock & Jimerson, 2017), antisocial and callous behavior (Waller et al., 2020), and psychopathologies (Decety, 2011). Therefore, conceptualizing and defining empathy and developing instruments to measure empathy in individuals are worthwhile research pursuits, especially considering that empathy is deemed a necessary quality for fostering harmonious social interactions, effective leadership, and healthy relationships.

Historical Overview of the Definitions and Conceptualizations of Empathy

Empathy is a construct, which means empathy exists as an abstract idea that explains a phenomenon that cannot be directly observed and measured (Mills & Gay, 2019). A construct can be measured as a latent variable after researchers first clearly define and operationalize the construct. To operationalize a latent variable, researchers identify aspects of the construct they wish to measure and use related, measurable indicators to quantify the construct of interest (Field, 2013; Mills & Gay, 2019).

Empathy is a complex construct (Ilgunaite et al., 2017), and philosophers, ethologists,

neuroscientists, psychologists, and sociologists have defined, conceptualized, and measured empathy according to the diverse disciplines and research contexts (Cerniglia et al., 2019). No universal, consistent definition of empathy appears in the literature (Neumann et al., 2015) to denote the experience of an observer (i.e., the empathizer) coming to know and understand the emotional state and experience of a target (i.e., the person experiencing an emotion). In fact, Batson (2009) identified and wrote about eight related phenomena that researchers and theorists have considered to be empathy: (a) an observer knowing the target's internal state; (b) the observer matching the neural responses of the target (i.e., mimicry); (c) an observer matching or catching the emotions of a target (i.e., emotion contagion); (d) an observer projecting himself or herself into the target's situation; (e) an observer imagining how a target is thinking or feeling; (f) an observer imagining how he or she would think or feel in the target's place; (g) an observer feeling distressed when witnessing the suffering of a target; and (h) the observer experiencing a feeling of concern for the target who is suffering.

One or more of the eight phenomena cataloged by Batson (2009) form the basis of contemporary conceptualizations and definitions of empathy. The conceptualizations remain complex and encompass a wide range of physiological mechanisms and include affective dimensions (i.e., affective empathy) and cognitive dimensions (i.e., cognitive empathy; Neumann et al., 2015). For example, Cuff et al. (2014) identified 43 distinct definitions or conceptualizations of empathy in the articles published between 1949 and 2012. Considering the myriad array of definitions of empathy, authors have opined that the number of definitions of empathy matches the number of researchers studying empathy (Baldner & McGinley, 2014; Decety & Jackson, 2004). However, common conceptual themes about empathy have emerged in the literature. First, definitions of empathy often include an affective component that involves the

sharing of emotions between an observer and a target (Neumann et al., 2015). Researchers often label the affective component affective empathy. Second, definitions incorporate a cognitive process, or cognitive empathy, to account for an observer's ability to know and to understand a target's emotional experience (Neumann et al., 2015).

Origin of the Term Empathy

The term *empathy* became part of the English vocabulary soon after the turn of the 20th century. In a 2005 article, Jahoda credited American psychologist Edward Titchener with coining the English term empathy in 1909 as a translation of the German word Einfühlung. The German psychologist Theodor Lipps had introduced the concept of Einfühlung in the field of psychology in 1903 to denote an observer's experience of knowing and understanding the mind of a target (Jahoda, 2005) or using imagination to project oneself into a target's situation (Batson, 2009). Similarly, Titchener used the term empathy to express how observers could objectively understand and appreciate the experiences of others (Neumann et al., 2015).

Conceptualizations of Empathy Reflected in Self-Report Instruments

Researchers have studied and measured empathy using multiple conceptualizations. Some researchers defined empathy as a unidimensional construct involving the sharing of emotions (Mehrabian & Epstein, 1972); as only an emotional process (Spreng et al., 2009); as only the cognitive ability to understand the experiences of another (Hogan, 1969); or as to imagine the experiences of a target by role taking or perspective taking (Dymond, 1949). Still, other researchers defined empathy as a bi-dimensional construct consisting of both emotional and cognitive dimensions (Innamorati et al., 2019; Jolliffe & Farrington, 2006) or as a multifaceted construct (Batchelder et al., 2017; Carré et al., 2013; Davis, 1980, 1983; Gerdes et al., 2010, 2011; Reniers et al., 2011) or as an umbrella term covering a broad array of related

processes (de Waal & Preston, 2017; Stietz et al., 2019). A clear and unified conceptualization or operational definition of empathy has yet to emerge in the literature (Baldner & McGinley, 2014, 2020; Cuff et al., 2014; Gerdes et al., 2011; Pinotti & Salgaro, 2019), but researchers continue to work to develop a consistent conceptualization and operationalization of empathy that is applicable across multiple disciplines and to construct valid, reliable instruments based upon the operational definitions to measure empathy in diverse research contexts (Baldner & McGinley, 2014, 2020; Batchelder et al., 2017; Gerdes et al., 2010, 2011; Innamorati et al., 2019; Reniers et al., 2011; Segal et al., 2017).

Researchers have used self-report instruments to measure empathy at least since the 1940s (Baron-Cohen & Wheelwright, 2004; Davis, 1983; Dymond, 1949). Self-report instruments appear to continue to be the preferred method in the 21st century to measure levels of empathy, as revealed in a qualitative analysis of empathy-measurement methods conducted by Hall and Schwartz (2019). Without regarding the definition or use of empathy, Hall and Schwartz used the PsycINFO database to identify studies that measured empathy empirically in adults during the years between 2001 and 2013. Hall and Schwartz applied, in addition to empathy, four search filters (i.e., peer-reviewed journal, adulthood, human, and empirical study) to locate relevant studies across multiple disciplines. Their search resulted in 2,162 articles from which Hall and Schwartz selected 404 studies. Only 393 of the 404 studies measured participants' empathy and, therefore, were included in the coding process. Hall and Schwartz coded the articles according to measurement source, measurement content, and whether the instrument had a name. They identified 72 different named instruments, 80% of which were self-reported measures of empathy. Considering that self-report instruments to measure empathy reflect the researchers' conceptualizations, definitions, and operationalization of empathy, Chapter 2 has

included a brief review of germane self-report instruments to provide a scope of the historical evolution of the conceptualization of empathy as reflected in the measurement of empathy. Self-report measures of empathy constructed for use in specific contexts, such as the Jefferson Scale of Physician Empathy (Hojat et al., 2001) and the Scale of Ethnocultural Empathy (Wang et al., 2003), have not been included in the review.

20th Century Instruments

Social scientists have conceptualized and measured empathy as either an automatic, vicarious emotional response or as a cognitive, perspective-taking skill or insight (Cerniglia et al., 2019; Mehrabian & Epstein, 1972). For example, Hogan's (1969) Empathy Scale measured cognitive aspects of empathy with 64 items as a single scale. An example item from the Hogan Empathy Scale is "Before I do something, I try to consider how my friends will react" (as cited in Batchelder et al., 2017, Table 4). Conversely, Mehrabian and Epstein's (1972) Questionnaire Measure of Emotional Empathy used 33 items and a 9-point scale ranging from −4 to +4 (−4 = *strong disagreement* and +4 = *strong agreement*) to measure only emotional aspects of empathy on seven subscales: (a) susceptibility to emotional contagion, (b) appreciation of the feelings of unfamiliar and distant others, (c) extreme emotional responsiveness, (d) tendency to be moved by others' positive emotional experiences, (e) tendency to be moved by others' negative emotional experiences, sympathetic tendency, and (f) willingness to be in contact with others who have problems. Example items from the Questionnaire Measure of Emotional Empathy are "It upsets me to see helpless old people" and "I cannot continue to feel OK if people around me are depressed" (Mehrabian & Epstein, 1972). Researchers have criticized Mehrabian and Epstein's instrument saying that it may be a confounded measure; items may measure cognitive responses (Davis, 1980) or emotional arousability (Baron-Cohen & Wheelwright, 2004) rather

than emotional empathy. The Hogan Empathy Scale, likewise, has been criticized. Davis (1980) noted that Hogan's single cognitive empathy score did not describe the apparent multidimensionality of empathy reflected by items in the instrument. Without providing examples, Davis contended that Hogan's instrument had items that measure emotional aspects of empathy in addition to items that measure cognitive aspects of empathy. Baron-Cohen and Wheelwright (2004) criticized the content of Hogan's instrument and opined that Hogan's scale was more likely a measure of social skills rather than cognitive empathy considering that the items measured even-temperedness, nonconformity, social self-confidence, and sensitivity and, according to Baron-Cohen and Wheelwright's conceptualization of empathy, only the items measuring sensitivity were related to empathy.

Mark Davis constructed the IRI (i.e., Interpersonal Reactivity Index) to integrate cognitive and affective dimensions of empathy within one instrument. The IRI was the first multidimensional measure of empathy (Gerdes et al., 2011). The 28 items on the final IRI were selected from an initial set of 50 items, which came from extant measures of empathy, based on the factor pattern loadings revealed in a Jöreskog (1969) factor analysis with oblique rotation. The IRI comprises four 7-item subscales (i.e., empathic concern, personal distress, perspective taking, and fantasy). Davis (1980) defined empathic concern as the "tendency for the respondent to experience feelings of warmth, compassion, and concern for others undergoing negative experiences" (p. 6). An example item from the empathic concern subscale is "I often have tender, concerned feelings for people less fortunate than me." Personal distress was defined as a respondent's "feelings of discomfort and anxiety when witnessing the negative experiences of others" (Davis, 1980, p. 6). An example from the personal distress subscale is "I tend to lose control during emergencies." Davis (1980) defined perspective taking as "a tendency or ability of

the respondent to adopt the perspective, or point of view, of other people" (p. 6). An item from the perspective taking subscale is "I believe that there are two sides to every question and try to look at them both." Finally, Davis (1980) defined fantasy as "a tendency of the respondent to identify strongly with fictitious characters in books, movies, or plays" (p. 6). An item from the fantasy subscale is "I daydream and fantasize, with some regularity, about things that might happen to me."

Since the time of its construction and publication in 1980, the IRI has become the most used self-report measure of empathy (Chrysikou & Thompson, 2016). In a literature review of available tools to measure empathy, Ilgunaite et al. (2017) identified 64 self-report instruments for measuring empathy in 223 studies published in academic journals between 2000 and 2016. The results of Ilgunaite et al.'s frequency analysis revealed that the IRI was the most used self-report measure of empathy (43 studies, 19.30%). The next most reported instruments were the Jefferson Scale of Physician Empathy (Hojat et al., 2001; 33 studies, 14.80%) and the Empathy Quotient (Baron-Cohen & Wheelwright, 2004; 25 studies, 11.20%). The remaining 61 self-report instruments were used in as many as 11 studies (4.90% of total studies) to a single study (0.40% of total studies), with 50 instruments being used in fewer than three studies.

Hall and Schwartz (2019) conducted a study similar to Ilgunaite et al.'s (2017) study. Hall and Schwartz's (2019) results generally align with Ilgunaite et al.'s (2017) findings. However, Hall and Schwartz (2019) identified 72 different named instruments in 393 studies published between 2001 and 2013 that measured empathy. Hall and Schwartz reported only the percentage of use for the instruments used in more than three studies (n = 14). Of the 14 instruments with reported percentages, the most often used instrument was the IRI (133 studies, 34%), and the next most often used instrument was the Empathy Quotient (Baron-Cohen & Wheelwright, 2004;

31 studies, 8%). The remaining 70 instruments were each used in 7% of the studies to less than 1% of the studies, with each of the remaining 56 instruments being used in three or fewer studies.

Critics of the IRI assert that Davis's empathic concern scale measures sympathy rather than empathy (Baldner & McGinley, 2014; Baron-Cohen & Wheelwright, 2004; Gerdes et al., 2011; Jolliffe & Farrington, 2006; Zickfield et al., 2017). Researchers often conflate sympathy and empathy (Wispé, 1986). Wispé (1986) reviewed the historical roots and use of the terms empathy and sympathy and determined that each concept, though related, represents a different psychological process. Therefore, Wispé proposed separate definitions for sympathy and empathy. Wispé's definitions have helped researchers and theorists to differentiate sympathy and empathy and to clarify the distinctions between the two concepts.

According to Wispé's (1986) definitions, sympathy is an observer's awareness of the suffering of a target and includes an increased desire to alleviate the target's distress. However, sympathy is associated only with negative emotions. Empathy, by contrast, refers to an observer's effortful attempts to feel and to understand either the positive or the negative emotions of a target. Although Davis (1983) depicted empathic concern as a dimension of empathy, he used the word sympathy in the description of empathic concern. Davis described the empathic concern scale as a measure of the feelings of sympathy that an observer has for unfortunate individuals. For that reason and in accordance with Wispé's (1986) definitions of empathy and sympathy, Baron-Cohen and Wheelwright (2004), Baldner and McGinley (2014), and Jolliffe and Farrington (2004, 2006) consider the IRI's empathic concern scale a measure of sympathy rather than a measure of empathy. Additionally, Baldner and McGinley (2014) discovered that the IRI's empathic concern scale demonstrated high Pearson's correlations with

Lee's (2009) Trait Sympathy Scale subscales (i.e., general trait sympathy, $r = .62$; sympathy for the disempowered, $r = .58$; and sympathy for the feelings of others, $r = .57$), which suggests that the empathic concern scale of the IRI conflates empathy and sympathy.

Jolliffe and Farrington (2004, 2006) have criticized the perspective-taking scale of the IRI. Jolliffe and Farrington contended that the perspective taking scale of the IRI is too broad as it assesses an observer's ability to adopt a target's view even when the target is not the individual experiencing an emotion (e.g., "When I am upset at someone, I usually try to put myself in his shoes for a while").

21st Century Instruments

Several instruments to measure empathy have been constructed during the first two decades of the 21st century. As researchers formed alternative conceptualizations founded on evidence and theories of empathy, conceptualizations of empathy have emerged that differ from Davis's (1980) four subscales of empathy. Accordingly, researchers have constructed and validated self-report instruments to reflect the new conceptualizations. Among the contemporary self-report instruments are the TEQ (i.e., Toronto Empathy Questionnaire; Spreng et al., 2009), the Questionnaire of Cognitive and Affective Empathy (QCAE; Reniers et al., 2011), the Affective and Cognitive Measure of Empathy (Vachon & Lynam, 2015), and the Empathy Components Questionnaire (ECQ; Batchelder et al., 2017). Each instrument has items that measure empathy according to its authors' conceptualization of empathy, and each instrument has been included in the literature review to provide a broad overview of extant conceptualizations of empathy as illustrations of the diverse array of self-report instruments used to measure empathy.

Spreng et al. (2009) constructed the TEQ to measure empathy as a unidimensional

emotional process. In a sample of 200 undergraduates (M_{age} = 18.8 years, *SD* = 1.2 years), Spreng et al. conducted an EFA on 142 items from 11 self-report measures of empathy or empathy deficits available at the time of their study. The researchers forced all items to load on a single factor to construct a unidimensional empathy questionnaire. Based on the results of the EFA, Spreng et al. retained 16 items that came from six previously validated self-report measures of empathy. The included items comprised all the items from the empathic concern subscale of the IRI. Spreng et al. validated the TEQ with 16 items in three studies with samples of university students. TEQ respondents indicated the frequency of behavior for each item using a scale of 0 (*never*) to 4 (*always*). Negatively worded items were reverse scored prior to summing a total TEQ score, with higher scores indicating higher levels of empathy. An example item from the TEQ is "I become irritated when someone cries" (reverse scored).

Spreng et al. (2009) did not publish the results of a CFA of the original, English version of the TEQ. However, Kourmousi et al. (2017) reported the results of a CFA of the Greek translation of the TEQ in a nationwide sample of Greek teachers (*N* =3955, M_{age} = 43.3 years, *SD* = 8.9 years). The results of a CFA with maximum likelihood estimation in a subsample (*n* = 1958) supported Spreng et al.'s (2009) unidimensional model of the TEQ with adequate fit: chi-square test (χ^2) was significant ($p < .05$); the comparative fit index (CFI) was .97; and the root mean square error of approximation (RMSEA) was .08 (Kourmousi et al., 2017). The TEQ has been criticized for being a single factor measure of empathy (Baldner & McGinley, 2014; Gerdes et al., 2011).

Reniers et al. (2011), using items from previously validated instruments as Spreng et al. (2009) had done, constructed the QCAE according to a two-factor conceptualization of empathy: cognitive empathy and affective empathy. To compile an initial pool of items for the QCAE,

Reniers et al. selected cognitive and affective items of the Empathy Quotient (Baron-Cohen & Wheelwright, 2004), Hogan's (1969) Empathy Scale, the empathy subscale of the Impulsiveness-Venturesomeness-Empathy Inventory (Eysenck & Eysenck, 1978), and the IRI. According to Reniers et al.'s (2011) concept of empathy, cognitive empathy requires an observer to hold and manipulate information in the mind. Reniers et al. defined cognitive empathy as an observer's comprehension of the experience of a target and defined affective empathy as an observer's swift recognition of the emotional state of a target based on body gestures, facial expressions, and voice inflection.

To construct the QCAE, Reniers et al. (2011) conducted an EFA using data derived from a sample of 640 university students (M_{age} = 23.7 years, SD = 7.84 years) who completed the initial instrument comprising 65 items. The EFA revealed five factors comprising 31 items. Consequently, the QCAE has items that measure both cognitive empathy and affective empathy with five subcomponents: two cognitive empathy subcomponents (i.e., perspective taking and online simulation) and three affective empathy subcomponents (i.e., emotion contagion, proximal responsivity, and peripheral responsivity). Reniers et al. conceptualized perspective taking as an intuitive process requiring no effort on the part of the observer. An example item from the perspective taking subscale is "I can tell if someone is masking their true emotion." The items used to measure online simulation reflect the observer's effortful attempt to understand the experience of the target. An example item for online simulation is "Before criticizing somebody, I try to imagine how I would feel if I was in their place." The emotion contagion subcomponent items reflect the automatic mirroring of feelings. An example item is "People I am with have a strong influence on my mood." Proximal responsivity items reflect the affective response of an observer in a close social context. An example item is "I get very upset when I see someone cry."

Finally, peripheral responsivity items reflect an observer's detached response to the emotions of a target. An example item is "I usually stay emotionally detached when watching a film." In a second study, Reniers et al. conducted a CFA using data derived from an independent sample of adults ($N = 318$, $M_{age} = 30.0$ years, $SD = 11.0$ years) who had been recruited via email invitations. The CFA revealed acceptable fit of a first- and second-order structure model, $\chi^2(85) = 244.309$, $p < .001$; RMSEA [90% CI] = .08 [.07, .09]; CFI = .93; the standardized root mean squared residual (SRMR) = .04. Baldner and McGinley (2020), however, identified issues in the wording of the items of the QCAE that indicated possible problems with its construct validity. Baldner and McGinley noted that the problematic items either asked two questions in one (i.e., double-barreled questions), used terms that participants could interpret in various ways, or that required the respondents to assess how others perceived their empathic abilities.

Other researchers have constructed instruments according to multidimensional conceptualizations of empathy to address the perceived deficits inherent in unidimensional or bidimensional self-report instruments. For example, Vachon and Lynam (2015) constructed the 36-item Affective and Cognitive Measure of Empathy to measure more adequately the aspects of empathy they conceived to be associated with aggressive behavior. Vachon and Lynam conducted an EFA using data from university students ($N = 369$) to determine a model of empathy reflecting three components: cognitive empathy, affective resonance, and affective dissonance. Cognitive empathy was defined as an observer's ability to detect and understand accurately the emotional experiences of a target. Vachon and Lynam broadly defined affective resonance as compassion, pity, empathic concern, and sympathy, which requires the observer's emotional response to align with the target's emotional expression. They described affective dissonance as an observer's experience of an emotional response that was inconsistent or

contrary to the emotional state of a target. Vachon and Lynam hypothesized the division of affective empathy into affective resonance and affective dissonance would provide a measure of empathy that would better predict aggressive behavior and externalizing psychopathology. A 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) was used to measure the positively and negatively worded items that assessed the respondents' abilities to recognize and understand the emotions of others, to experience the emotions of others, and to choose behaviors based on emotional information. Higher scores indicated higher levels of empathy. Example items include "I can tell when someone is afraid" (cognitive empathy), "It makes me feel good to help someone in need" (affective resonance), and "I get a kick out of making other people feel stupid" (affective dissonance, reverse scored). A CFA of the three-component structure of the Affective and Cognitive Measure of Empathy revealed good model fit in a second study with an independent sample of university students ($N = 708$): CFI = .97, RMSEA = .04 (Vachon & Lynam, 2015).

Batchelder et al. (2017) constructed the ECQ to measure components they believed other measures of empathy lacked. Batchelder et al.'s conceptualization of empathy included components to denote not only respondents' ability to empathize but also respondents' motivation, or drive, to empathize. Using an instrument construction method similar to the method employed by Spreng et al. (2009) and Reniers et al. (2011), Batchelder et al. selected items from five previously validated questionnaires to create an initial pool of 89 items for the ECQ. Subsequent to an EFA, the ECQ was reduced to 27 items. Batchelder et al. constructed and validated the ECQ in two studies using samples of university students ($N = 101$) and typical adults ($N = 211$) who had been recruited via opportunity sampling within the University of Bath campus and the surrounding community in the United Kingdom. Respondents used a 4-point

scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*) to indicate their degree of agreement with each item. Negatively worded items were reverse scored, and higher scores indicated higher levels of empathy. The results of a CFA using maximum likelihood estimation in the second study revealed a good fit for the hypothesized five-component model consisting of cognitive ability, cognitive drive, affective ability, affective drive, and affective reactivity. Batchelder et al. reported the goodness-of-fit results of the fourth measurement model tested as $\chi^2(313) = 502.36$, $p < .001$; RMSEA [90% CI] = .05 [.05, .06]; CFI = .90; and SRMR = .06.

According to Batchelder et al.'s (2017) conceptualization of empathy, cognitive ability refers to an observer's ability to understand and adopt the perspective of a target, to infer a target's thoughts, and to judge and understand the intentions of a target. An example item is "I am usually successful in judging if someone says one thing but means another." Batchelder et al. defined cognitive drive as the desire, tendency, or motivation of an observer to understand the perspective of a target. An example item to measure cognitive drive is "I like trying to understand what might be going through my friends' minds." Affective ability was described as an observer's ability to share a target's emotion. An example item for the component is "I don't intuitively tune into how others feel" (reverse scored). Affective drive was defined as an observer's desire, tendency, or motivation to engage with others emotionally. An example item is "When I do things, I like to take others' feelings into account." Affective reactivity was conceived as an observer's appropriate response and reaction to a target's emotional experience. An example item is "When someone is crying, I tend to become very upset myself."

Conceptual Inconsistencies

The quantity of self-report instruments illuminates conceptual inconsistencies and reveals the lack of a clear operationalization of empathy (Baldner & McGinley, 2014, 2020; Gerdes et

al., 2010). The lack of consistent definitions and conceptualizations is problematic in the research of empathy, considering that inconsistent and vague operational definitions preclude meaningful comparisons among studies of empathy (Baldner & McGinley, 2014, 2020; Gerdes et al., 2010). Baldner and McGinley (2014) conducted an EFA using data in a sample of undergraduate students ($N = 497$) to assess the commonalities between five self-report measures of affective and cognitive empathy: the IRI, the How I Feel in Different Situations Scale (Feshbach et al., 1991), the Empathy Quotient (Baron-Cohen & Wheelwright, 2004), the TEQ (Spreng et al., 2009), and the Basic Empathy Scale (Jolliffe & Farrington, 2006). The results of the EFA revealed multiple items from the scales that may reflect constructs other than empathy, which suggests conceptual inconsistencies exist within the five instruments purported to measure empathy (Baldner & McGinley, 2014). Subsequently, Baldner & McGinley (2020) conducted an EFA in a sample of undergraduate students ($N = 855$; $M_{age} = 19.8$) in a study that assessed the commonalities of affective and cognitive empathy using three of the measures from their 2014 study (i.e., the IRI, the How I Feel in Different Situations Scale, and the Basic Empathy Scale) and two additional self-report measures: the 17-item EAI (Lietz et al., 2011) and the QCAE (Reniers et al., 2011). The results of Baldner and McGinley's 2020 study were similar to the results in their 2014 study and indicated that the five self-report instruments used in the second study contained nonessential items and poor convergent and content validity related to cognitive and affective empathy. The finding illustrates the continued issues existing in the conceptualization and definition of empathy.

A team of social work researchers constructed the EAI (Segal et al., 2017) to address the inconsistencies and disunity regarding the conceptualizations of empathy (Gerdes et al., 2010, 2011, 2012; Lietz et al., 2011; Segal et al., 2017). As stated in Chapter 1, the conceptualization of

the EAI was based on an SCN (i.e., social cognitive neuroscience) conceptualization of empathy, which merged the cumulative research and conceptualizations of empathy derived from the social science fields with the empirical evidence from cognitive neuroscience field. A review of the construction of the EAI is presented later in the chapter after a review of the SCN conceptualization of empathy.

The Social Cognitive Neuroscience Conceptualization of Empathy

A new conceptualization of empathy emerged during the early years of the 21st century. Advances in neuroimaging technology enabled researchers to map the neural pathways of the psychological processes believed to be associated with the experience of empathy (Gerdes et al., 2011). In their seminal article on the functional architecture of human empathy, Decety and Jackson (2004) wrote a review of the emerging evidence from the fields of developmental psychology, psychotherapy, clinical neuropsychology, social psychology, and cognitive neuroscience. Based on conclusions drawn from their review, Decety and Jackson suggested that a clearer definition of empathy was needed to achieve interpretable results that would facilitate comparisons across studies in empathy research and proposed a new model of empathy. According to Decety and Jackson, the experience of empathy results from the interaction of three functional components: affective sharing, self-other awareness, and mental flexibility. Affective sharing is related to perception-action coupling, which results in shared representations between an observer and a target. Self-other awareness refers to the ability of an observer to temporarily identify with the target's emotional state without becoming confused regarding the origination of the emotion. Finally, mental flexibility denotes the regulatory processes and the ability of an observer to adopt the subjective perspective of a target. The three functional components, in turn, consist of four information processing mechanisms involved in the full experience of empathy:

shared neural representations (i.e., affective sharing), self-awareness, mental flexibility, and emotion regulation (see also, Decety & Moriguchi, 2007).

Each of the four mechanisms is associated with observable, discrete, and partially overlapping neural pathways that researchers have detected and mapped in neuropsychological brain lesion studies and neuroimaging studies using advanced methods such as functional magnetic resonance imaging (fMRI), transcranial magnetic stimulation, magnetoencephalography, and positron emission tomography (Decety & Jackson, 2004, 2006; Decety & Moriguchi, 2007). The results of quantitative meta-analyses of neuroimaging studies and coordinate-based meta-analyses of fMRI experiments provide supporting evidence of the underlying neural processes facilitating the experiences of empathy (Decety & Moriguchi, 2007; Fan et al., 2011; Lamm et al., 2011, 2015; Jauniaux et al., 2019).

Additionally, Decety and Moriguchi (2007) conceived empathy as a phenomenon that exists on a continuum rather than existing as an all-or-nothing phenomenon. As a process involving motivation, empathy can be restrained when it has been automatically triggered in an observer through visual or auditory cues, or it can be intentionally triggered when an observer engages in mentalizing (Decety & Jackson, 2004, 2006; Decety & Moriguchi, 2007). Empathy is a flexible human capacity based on shared representations that enable an observer to come to know and to understand the experiences of a target (Decety & Jackson, 2004; Decety & Moriguchi, 2007). Feelings of compassion or sympathy or acts of altruism or prosocial behavior are responses to an empathic experience and are not conceptualized in the SCN model as necessary components of the full experience of empathy (Decety & Jackson, 2004; Decety & Moriguchi, 2007).

Perception-Action Coupling

Perception-action coupling is the mechanism underlying the ability of humans to experience and understand the emotions of other humans and is associated with affective sharing (de Waal & Preston, 2017). The ability for humans to form representations within the self of the observed behaviors of others forms the core of Decety and Jackson's (2004) and Decety and Moriguchi's (2007) conceptual framework of empathy. According to the perception-action coupling model, perceiving leads to actions, and actions lead to perceptions. In the context of empathy, the perception-action coupling mechanism explains the processes involved in the sharing of emotions. When the observer perceives a target's expressed emotion (i.e., the target's action), the observer's brain creates a representation of the emotion (i.e., action) and experiences (i.e., perceives) the emotion as if the emotion originated within the self (Decety & Jackson, 2004, 2006; Decety & Lamm, 2006; de Waal & Preston, 2017), which is an experience of affective sharing.

Underlying the perception-action model is a neural process by which observers form representations by recalling personal feelings, memories, and associations that they perceive to be related to the target's emotional state and situation (de Waal & Preston, 2017). The shared representation of emotions, either positive valanced emotions or negative valanced emotions, is a necessary but not sufficient mechanism to account for empathy (Decety & Moriguchi, 2007); however, empathy exists only in the context of shared emotions.

Bottom-Up and Top-Down Processes of Empathy

The observer can control the personal experience of empathy through bottom-up information processing and top-down information processing (Decety & Lamm, 2006; Decety & Meyer, 2008). When the observer directly witnesses the emotional state of a target, affective

sharing is a bottom-up process automatically triggered by the perception-action coupling mechanism. The observer, however, can consciously inhibit further processing of the shared representation through top-down processes that can prevent the experience of empathy. However, if the observer does not inhibit the processing of the shared emotion through the top-down processing of the affective response, the emotion information will continue to be processed, and empathy may occur. The perception-action coupling mechanism can also be activated through top-down processing by mental flexibility when an observer imagines the emotional experience of a target (i.e., affective mentalizing) or engages in perspective taking. Top-down processes recruit the executive function areas of the brain to regulate, by activation or inhibition, emotion sharing and a motivation to engage in an empathic experience (Decety, 2011).

Brain imaging studies demonstrated that the components of empathy related to bottom-up processes and top-down processes have different developmental trajectories (Decety, 2010; Tousignant et al., 2017). The affective empathy component, known as affective arousal (Decety, 2010) or affective sharing (Decety & Jackson, 2004; Decety & Moriguchi, 2007; Tousignant et al., 2017), is a bottom-up process (de Waal & Preston, 2017) present at birth that develops quickly during the first year of life (Hoffman, 1977; Tousignant et al., 2017). The cognitive empathy components (i.e., self-other distinction, mental flexibility, and emotion regulation), however, comprise top-down processes that develop more slowly as the brain matures and do not develop at the same rate as the affective sharing component (Decety, 2010; Tousignant et al., 2017). As humans develop, they increasingly come to understand the emotions of others, to differentiate the self from others, and to engage in perspective taking.

The last component of empathy to develop is emotion regulation. Emotion regulation is associated with executive function, which is processed in the prefrontal cortex and is the final

area of the brain to fully develop. Neuroimaging data described by Decety (2010) indicated that as humans develop and grow older, the patterns of neural responses change; fMRIs revealed a shift from emotion detecting brain regions to emotion processing regions when participants engaged in research activities related to emotional experiences. Decety (2010) explained that young individuals experienced empathy more as an emotion detecting and automatic emotion response experience, but older individuals experienced empathy as an evaluative process.

The Empathy Assessment Index

The EAI (Gerdes et al., 2010, 2011, 2012; Lietz et al., 2011; Segal et al., 2017) is a new self-report, multidimensional empathy index published during the second decade of the 21st century. A team of social workers and educators at Arizona State University in Phoenix, Arizona, constructed and validated the EAI, which is, according to its authors, a "comprehensive and concise self-report index" (Gerdes et al., 2011, p. 238). Prior to undertaking the task of constructing a new instrument, the team of researchers searched the literature for a self-report empathy index they could use to measure empathy in healthy adults and in adults within a clinical setting (Gerdes et al., 2011; Segal et al., 2017). However, their search yielded no suitable index for their purposes. Gerdes et al. (2011) considered the existing self-report instruments outdated as the instruments did not reflect a conceptualization of empathy based upon the findings from the nascent field of SCN or the evidence of the observable neural pathways underpinning the empathic process.

Unlike the authors of the TEQ (Spreng et al., 2009) and the QCAE (Reniers et al., 2011), who had constructed self-report instruments by combining items from previously validated instruments, Gerdes et al. (2011) wrote original items after conducting a review of the SCN literature (Gerdes et al., 2010). Gerdes et al. (2011) constructed items to be indicators (i.e.,

observed variables) of the four observable neural networks or mechanisms described by Decety and Jackson (2004, 2006), Decety and Moriguchi (2007), and Preston and de Waal (2002): affective sharing, self-other awareness, mental flexibility, and emotion regulation. Gerdes et al. (2011, 2012), Lietz et al. (2011), and Segal et al. (2017) labeled the mechanisms as affective response, self-other awareness, perspective taking and affective mentalizing, and emotion regulation, respectively. According to Gerdes et al. (2012), no other self-report measure of empathy at the time of the construction of the EAI reflected components of empathy based on the neuroscientific evidence of the SCN literature. Indeed, besides the EAI, no self-report measures of empathy explicitly based on the SCN literature were discovered during a search of the literature for the years between 2000 and 2020.

The EAI Components

Affective Response

The affective response component of the EAI represents the affective sharing mechanism that enables affective sharing, or the sharing of emotional representations, as described in the SCN conceptualization of empathy. The shared representation mechanism enables humans to understand another's actions, process another's pain, and recognize and name another's emotions (Jackson et al., 2006; Segal et al., 2017). Shared representation processing is an innate ability (Segal et al., 2013) and does not occur in a specific location in the brain; rather, the neural pathways instantiating shared representations occur throughout the brain (Decety & Jackson, 2004; Decety & Moriguchi, 2007). Evidence from brain mapping studies revealed that when the brain detects an emotion, regions of the brain related to the processing of emotions (e. g., the amygdala, hypothalamus, and orbitofrontal cortex) rapidly process the emotion signal and create an affective response (Decety, 2010). The affective response, if not inhibited through the

conscious choice of the observer, would then be cognitively processed through top-down processing. Affective responses can occur for both positively and negatively valanced emotions (Decety & Moriguchi, 2007; Lamm et al., 2019); and, although the observer's emotion may not be the exact emotion expressed by the target, the felt emotion in empathy will be isomorphic (Decety & Moriguchi, 2007).

Segal et al. (2013) defined affective response, the only affective empathy measure in the EAI, as an observer's unconscious, automatic, and involuntary sharing of a target's emotion that occurs when an observer receives a target's external cues of emotion (i.e., facial expressions, tone of voice, body posture). Affective responses can occur for both emotions and physical sensations (i.e., feeling pain when seeing a target experience an injury; Segal et al., 2013). In addition to occurring through external visual cues, an affective response can occur within an observer through the internal process of imagining the emotional state or level of pain of a target (e.g., perspective taking or affective mentalizing) without any direct observation of the target (Decety & Jackson, 2004; Decety & Moriguchi, 2007; Segal et al., 2013, 2017).

Self-Other Awareness

The self-awareness mechanism, an innate ability, enables an observer to differentiate his or her emotions and experiences from those of a target. According to Decety and Jackson (2004), empathy presumes self-awareness or the sense of agency. To experience empathy, the observer must remain cognizant of the origin of the felt emotions and maintain the distinction between the emotions of the self and the emotions of the target; otherwise, the observer may be overcome by the target's emotional state and experience personal distress rather than empathy (Lamm et al., 2015). The psychological conceptualization of empathy advanced by psychotherapist Carl Rogers (1957) embodied the concept of self-other awareness. Rogers conceived empathy as the

observer's ability to experience the emotions of a target without the observer forgetting that the felt emotion belongs to and originated within the target. Neuroscientific brain-imaging evidence indicates that an observer's self-awareness ability is connected to the observer's ability to think about a target's emotions and to adopt another person's perspective (Decety & Jackson, 2004; Lamm et al., 2015).

Self-other awareness is also known as self-other differentiation, self-awareness, and self-other distinction (Tousignant et al., 2017). As defined by the authors of the EAI, self-other awareness is an observer's ability "to recognize the difference between the experiences of another person from his or her own experiences" (Segal et al., 2013, p. 133). A healthy self-other distinction prevents the observer from blurring the line between the self and the target (Decety, 2010). Thus, empathy involves both understanding personal emotions from the first-person point of view as well as understanding interpersonal relationships and the emotions of others from a third-person point of view (Tousignant et al., 2017).

The capacity to develop self-other awareness is present at birth (Tousignant et al., 2017), but the development of fully functioning self-awareness occurs gradually during the first three years of life (Decety, 2010) and becomes more explicit and refined during childhood. Researchers have observed children as young as 12 months comforting targets experiencing distress (Decety, 2010). Children are able to differentiate their own emotions, thoughts, and desires from those of others by the time they are 2-years old (Tousignant et al., 2017).

Mental Flexibility: Perspective Taking and Affective Mentalizing

Mental flexibility is an essential aspect of empathy and requires an observer to have the ability to recognize the target as like the self but separate from the self (Decety & Moriguchi, 2007). Mental flexibility is an effortful and controlled process an observer employs to take the

perspective of a target and to assume the target's point of view (Decety & Jackson, 2004). Mental flexibility is a top-down cognitive process and involves perspective taking, affective mentalizing, and self-regulatory processes (Decety & Jackson, 2004; Decety & Moriguchi, 2007; Walter, 2012).

Compared to the rapid development of the components of affective response and self-other awareness, the development of perspective taking and mentalizing occur gradually during childhood and are refined during adolescence (Decety, 2010; Tousignant et al., 2017). Children around 4 years of age begin to understand that others have different thoughts and beliefs than they have (Tousignant et al., 2017). Evidence from the neuroimaging studies reviewed by Tousignant et al. suggests that infants can take the perspective of others as early as 6 months old. Brain imaging evidence also demonstrates that the regions of the brain involved in perspective taking and mentalizing in adolescents differ from the brain regions of perspective taking and mentalizing in adults (Decety, 2010; Tousignant et al., 2017).

Perspective Taking. Perspective taking is a top-down process that modulates the affective response by enabling the observer to understand the target's emotion and the context in which the target experiences the emotion (Tousignant et al., 2017). Brain imaging studies (e.g., fMRI studies) have shown that perspective taking occurs in discrete regions of the brain (Decety & Moriguchi, 2007). Imagining the experiences of a target, or perspective taking, requires an observer to make an effortful and conscious choice to adopt the subjective point of view of the target (Decety & Jackson, 2004). Empathic perspective taking entails an observer recognizing and overcoming an ego-centric bias of self-perspective to adopt an other-perspective view of the target's experience (Decety & Jackson, 2004). Segal et al. (2013) described perspective taking as the cognitive ability of an observer to imagine "what it might be like to experience the

experiences" (p. 133) of a target and as the "stepping into the shoes of another" (p. 133). Hence, perspective taking involves the observer viewing an emotion-triggering event as the target views the event rather than viewing the event from how the observer would view the event if he or she were in the place of the target (i.e., "What does the target feel in the situation?" rather than "What would I feel if I were the target in the situation?").

Affective Mentalizing. Mentalizing is a term used to describe the social-cognitive ability to infer and predict the beliefs, intentions, desires, and emotions of another person as well as the affective states of others (Decety, 2011; Decety & Moriguchi, 2007, Walter, 2012). Affective mentalizing specifically is an observer's ability to be aware of and to understand emotions and to imagine or infer the emotional state of a target without external emotional cues such as a target's facial expressions or tone of voice (Gerdes et al., 2012; Tousignant et al., 2017; Walter, 2012). Affective mentalizing can trigger an affective response in an observer (Tousignant et al., 2017; Walter, 2012). Segal et al. (2013) defined affective mentalizing as "the ability of a person to develop a picture of events and perceive another's experiences as it is happening to himself or herself" (p. 133) and viewed affective mentalizing as an expansion of perspective taking (Gerdes et al., 2012)

Neural evidence from brain imaging studies has indicated that affective mentalizing and affective responses co-occur; when visual cues of a target trigger an automatic affective response in an observer, the observer begins to think about, or mentalize, the emotional state of the target (Walter, 2012). However, affective mentalizing related to empathy requires only that the observer understands the emotional state of the target and does not require an observer to experience the same emotion as the target (Walter, 2012). Affective mentalizing, therefore, is a "means to attain affect sharing rather than being part of affect sharing itself" (Lamm et al., 2019, p. 50).

The term affective perspective taking has appeared in recent literature to describe what previous authors had called affective mentalizing. Contemporary authors use the term mentalizing to denote perspective taking in general and have subdivided perspective taking into two types: cognitive perspective taking and affective perspective taking (Healey & Grossman, 2018; Tousignant et al., 2017). Tousignant et al. (2017) defined cognitive perspective taking as the attribution of the beliefs and intentions to others, whereas Healey and Grossman (2018) described cognitive perspective taking as the ability of an observer to take a target's point of view. Both Tousignant et al. (2017) and Healey and Grossman (2018) described affective perspective taking as the ability of an observer to infer a target's emotions and feelings or to attribute emotions to the target.

Evidence from fMRI studies has indicated that affective perspective taking and cognitive perspective taking have discrete neural underpinnings (Tousignant et al., 2017) and that imagining the emotions of a target recruits brain regions associated with inferring and representing mental states of others (i.e., mentalizing; Lamm et al., 2011; Tousignant et al., 2017; Walter, 2012). Healey and Grossman (2018) presented further evidence of the difference between cognitive perspective taking and affective perspective taking processing in their summary of extant functional brain imaging studies that had compared the neural correlates of cognitive and affective perspective taking and reported that the evidence appears to indicate that affective perspective taking, or affective mentalizing, and cognitive perspective taking activate not only separate but also overlapping neuroanatomic networks.

Emotion Regulation

An observer can control the duration and intensity of the experience of empathy and can choose to engage or disengage in the empathic experience (Decety, 2010). Emotion regulation,

the ability to sense a target's emotions without becoming overwhelmed by the intensity of the experience, is a necessary component of empathy. Emotion regulation is a top-down process that observers engage to inhibit, maintain, or modulate the degree of the affective response (Decety & Jackson, 2004; Decety & Lamm, 2006; Tousignant et al., 2017). Individuals with greater emotion regulation abilities demonstrated more effortful control over affective responses and responded with greater empathic concern (Decety, 2010; Tousignant et al., 2017). People with weak emotion regulation skills appear to be unable to mediate the affective response and, therefore, may experience greater levels of personal distress (Tousignant et al., 2017). Without the emotion regulation mechanism, shared representations of emotions could lead to emotion contagion or emotional distress rather than empathy (Decety & Jackson, 2004). Additionally, emotion regulation is necessary to prevent a complete merging of the self with the other. Therefore, emotion regulation is related to both self-other awareness and mental flexibility (Decety & Jackson, 2004).

Brain imaging studies have revealed a relationship between emotion regulation and the prefrontal cortex and its association with executive function (Decety & Jackson, 2004). The appraisal mechanism of emotion regulation, which is underpinned by executive functions and the subcortical limbic structures (Decety, 2010), enables the observer to engage or disengage with a target after the triggering of an affective response. By engaging in down-regulating processing mechanisms, the observer can distance himself or herself from a distressing emotion to prevent becoming overwhelmed by the emotional state of the target, thus avoiding emotion contagion or personal distress (Decety & Jackson, 2006; Decety & Moriguchi, 2007).

Emotion regulation is the slowest component to develop in the brain and develops along the same trajectory as executive function, metacognition, and the prefrontal cortex regions

(Decety, 2010; Tousignant et al., 2017). Infants lack the ability to regulate their emotions, and until about 3 months of age, they are unable to demonstrate control over an affective response (Decety, 2010). However, when infants develop motor control, they begin to regulate their emotions through self-distraction and self-soothing strategies (Tousignant et al., 2017), and as children grow older, the emotion regulation strategies become more complex. The development of more effective emotion regulation strategies extends through adolescence and into adulthood (Decety, 2011; Tousignant et al., 2017).

Construction and Validation Studies of the EAI

Pilot Study

The theoretical framework of the pilot version of the EAI was based on what Gerdes et al. (2011) considered to be a comprehensive definition of empathy. The EAI's framework was rooted in developmental psychology and SCN and originally included three components: affective response to another person's emotions and actions, cognitive processing of the felt affective response and the perspective of the target, and the conscious choice to take empathic action. The three components encompassed five separate dimensions, which Gerdes et al. (2011) believed were necessary for a full expression of empathy: affective response, perspective taking, self-awareness, emotion regulation, and empathic attitudes. Gerdes et al. (2011) included the empathic attitudes component in the pilot study of the EAI because they believed "to be empathetic is to experience an affect, process it, and then take action" (p. 86). The empathic attitudes component served as a proxy for empathic action or behavior, which Gerdes et al. believed, at the time, was a necessary component of a full experience of empathy (Lietz et al., 2011).

Gerdes et al. (2011) reviewed the concepts from existing measures of empathy before

writing novel items for the new empathy measure with items worded according to the theoretical connections of the items to each dimension of their model. To establish face validity, three experts in measurement and three laypeople reviewed the preliminary items. The items were subsequently revised until the experts and laypeople were satisfied with the wording of each item.

Gerdes et al. (2011) administered the index to 312 university students enrolled in social work courses at Arizona State University, Phoenix. The EAI comprised 54 randomized items measuring five components of empathy: affective response, perspective taking, emotion regulation, self-awareness, and empathic attitudes. Subjects used a 5-point Likert-scale (1 = *never* to 5 = *always*) to respond to each item. Two-hundred twelve (74%) social work students completed a retest of the pilot version of the EAI within 5 days of completing the instrument the first time. A reliability analysis using Cronbach's alpha indicated that four of the subscales had acceptable (emotion regulation, $\alpha = .70$) to excellent internal reliability (empathic attitudes and perspective taking, $\alpha = .81$; affective response, $\alpha = .83$). The self-awareness subscale had poor reliability ($\alpha = .30$).

Gerdes et al. (2011) analyzed the concurrent validity of three subscales of the EAI using two subscales from Davis's IRI (i.e., empathic concern and perspective taking). Gerdes et al. computed Pearson's *r* correlation coefficients to determine the correlation between the affective response subscale and empathic attitudes subscale of the EAI and the empathic concern subscale of the IRI ($r = .48$ and $r = .57$, respectively). The EAI's perspective taking subscale was correlated with the perspective taking subscale of the IRI ($r = .75$). A test-retest analysis of the EAI subscales demonstrated strong significant correlations (*r* values ranging from .80 to .85, $p = < .001$) for affective response, empathic attitudes, emotion regulation, and perspective taking

subscales. The self-awareness subscale test-retest correlation was less than .60 (r = .59); therefore, Gerdes et al. planned to replace the self-awareness subscale items and to improve the emotion regulation subscale by adding items before a subsequent validity study. Gerdes et al. eliminated eight items, including all the items of the self-awareness subscale, according to the results of the reliability analyses. Then, Gerdes et al. conducted an EFA using the remaining 46 items. The results of the EFA revealed six components that explained over 43% of the explained variance. Gerdes et al. deleted 12 items after the EFA, leaving 34 items as the foundation for additional refinements and subsequent validation studies of the EAI.

An EFA and a CFA Study

After the pilot study, Lietz et al. (2011) conducted an EFA and a CFA of the EAI. First, Lietz et al. revised the affective response component, increased the number of items to measure both emotion regulation and perspective taking, and reconceptualized the self-awareness component to highlight self-other differentiation beginning with the 34 items from the pilot study. The revised EAI comprised 50 items measuring five components, or dimensions, of empathy: affective response, perspective taking, emotion regulation, self-other awareness, and empathic attitudes. In addition, the researchers eliminated reverse-scored items for all components except emotion regulation. Based on recommendations from a focus group comprising social work students and two expert reviewers, Lietz et al. changed the 5-point Likert scale to a 6-point Likert scale by adding *almost always* as a choice between *frequently* and *always*. Thus, the final response scale was 1 = never, 2 = rarely, 3 = sometimes, 4 = frequently, 5 = almost always, and 6 = always (Segal et al., 2017).

Lietz et al. (2011) recruited a convenience sample of undergraduate and graduate students and used a snowball sampling method to recruit nonstudent participants from the community.

Participants completed the online version of the EAI independently. Considering that subsequent *t*-test comparisons indicated no significant differences between the component mean scores of students and nonstudents, Lietz et al. combined the student sample (n = 688) and nonstudent sample (n = 85) to form one sample (N = 773, M_{age} = 21.4 years) to use in a CFA. Lietz et al. (2011) reported that the sample overrepresented women (74.4%) and undergraduates (89%).

To analyze the data, Lietz et al. (2011) first conducted a missing values analysis using the expectation-maximization algorithm to impute missing values. They performed internal consistency reliability tests of each of the five components and found acceptable to excellent internal consistency (Cronbach's alphas ranged from .70 to .84). Lietz et al. conducted *t*-tests to compare the mean differences of total EAI scores across race and ethnicity and found no statistically significant differences, indicating that the EAI may be useful within diverse populations.

Lietz et al. (2011) randomly divided the sample into two comparably sized subsamples (n = 389 and n = 384) to conduct two independent CFAs using one data set using Mplus. The researchers treated the data as ordinal-level data and used weighted least squares with mean- and variance-adjusted chi-square tests as the estimation method. Before beginning the CFA, Lietz et al. eliminated ten items due to improper loading or reliability analyses, therefore leaving 40 items for the CFA.

Lietz et al. (2011) compared five models using data from 40 items from the first subsample (n = 389): a 40-item, five-component model; a 24-item, five-component model; a 24-item, five-component model with eight covariances added; a 17-item, five-component model; and a 17-item, five-component model with a correlated error. In addition to the chi-square goodness of fit index, Lietz et al. used the following indices and standards of good fit: the

normed chi-square statistic (NC; the ratio of chi-square vs. $df \leq 2.00$), the CFI ($\geq .95$), the weighted root mean residual (WRMR; < .95); and the RMSEA ($\leq .06$) with a 90% confidence interval. The 17-item, five-component model demonstrated the best model fit of all the tested models and demonstrated a good model fit with the first subsample (NC = 1.73; CFI = .98; WRMR = .80; RMSEA = .04, [0.03, 0.05]). "The 17 item five-component model comprised three affective response items, three self-other awareness items, four perspective taking items, four emotion regulation items, and three empathic attitude items" (Lietz et al., 2011, p. 112). All factor loadings on the five latent constructs of empathy were statistically significant.

Lietz et al. (2011) then evaluated the 24-item and the 17-item five-component models using data from the second subsample ($n = 384$) and found satisfactory model fit for the 17-item, five-component model with two error covariances added (NC = 1.73; CFI = .95; WRMR = .97; RMSEA = .06 [.05, .07]).

The result of an analysis of the intercorrelations between each component revealed a high intercorrelation between perspective taking and self-other awareness ($r = .86$). However, Lietz et al. (2011) regarded the high intercorrelation as consistent with the neuroscience literature that indicated perspective taking and self-other awareness, though isolable at the neural level, operate in conjunction with each other. Lietz et al. modified the 17-item instrument prior to a third validation study.

Known-Groups Study

Based on the results of the EFA and CFA study (Lietz et al., 2011), Gerdes et al. (2012) determined that a four-component model of empathy based purely on the SCN conceptualization of empathy was the better option for measuring empathy. Gerdes et al. revised the 17-item instrument from their previous study (Lietz et al., 2011). First, Gerdes et al. (2012) modified the

affective response component items to improve content validity because the intercorrelation between self-other awareness and affective response (r = .58) was not as strong as theoretically expected. Second, considering that the empathic attitude component had very low intercorrelations with the other components (r values ranging from .18 to .23), Gerdes et al. removed the empathic attitudes component and the associated items from the instrument and added items for each of the four retained components (i.e., affective response, self-other awareness, perspective taking, and emotion regulation). In 2012, Gerdes et al. published the results of a known-groups validity study of the 20-item version of the EAI that measured empathy with four components: affective response, self-other awareness, perspective taking, and emotion regulation. No results of a CFA of the 20-item, four-component model of the EAI were found in the literature.

Gerdes et al. (2012) administered the 20-item, four-component version of the EAI to a convenience sample of social service providers (n = 197) and three groups of social service recipients (n = 453) receiving treatment in violent offender programs at different agencies. Group A comprised service recipients receiving treatment for sexual offenses (n = 251). Group B comprised service recipients receiving treatment for anger management or misdemeanor domestic violence (n = 155). Group C comprised service recipients receiving treatment for domestic violence (n = 47). Gerdes et al. hypothesized that the EAI total mean scores and mean component scores of the social service providers would be higher than the total mean scores and mean component scores of the social service recipients. The 6-point Likert scale (1 = *never* to 6 = *always*) was the same scale used in the 17-item version of the EAI. The four components of the 20-item EAI were each measured with five items.

The service recipients voluntarily completed a paper version of the survey at the site

where they received services, and the service providers completed the instrument as an online survey (Gerdes et al., 2012). Gerdes et al. reported that the results of regression analyses of the total EAI scores demonstrated higher mean empathy scores of the service providers compared to all three groups of service recipients. However, the differences were significant in only two of the three recipient groups (Group A: $\beta = -4.22$, $SE = 1.17$, $p = .037$; Group C: $\beta = -7.83$, $SE = 0.86$, $p = .003$).

Gerdes et al. (2012) used differential item functioning analyses to assess whether each item measured the same concept in the service provider group and in the service recipient groups. The results revealed that five of the 20 items did not meet the criteria for measurement invariance. Based on the analyses, the researchers reevaluated the five items that had been answered differently between the two groups. Gerdes et al. determined that three of the items were vague; therefore, they revised two of the items related to affective response to reflect more specifically the perception-action model and eliminated an item intended to measure self-other awareness (i.e., "I am aware of my thoughts"). Further, to reflect the neuroscientific emphasis related to the cognitive processing of emotion awareness and understanding, Gerdes et al. broadened the perspective-taking component to include affective mentalizing. Accordingly, Gerdes et al. added a fifth component (i.e., affective mentalizing) to their conceptual model and four items to measure the new component. Although Gerdes et al. reported that they intended to conduct a CFA after making the described revisions to the EAI, no published results of a CFA subsequent to the stated modifications were found in the literature.

Measurement Model Uncertainties of the EAI

The 22-Item EAI

The 22-Item EAI comprises 22 items to measure five components of empathy: affective

response, self-other awareness, perspective taking, emotion regulation, and affective mentalizing (Segal et al., 2017; see Appendix A). Refer to Figure 1 in Chapter 1 for a representation of the conceptual model of the 22-Item EAI. No validation study of the 22-Item EAI was found in the literature. However, in a sample of 427 undergraduate and graduate students in the helping professions, Greeno et al. (2018) explored the relationship between empathy, self-esteem, and work engagement using the 22-Item EAI. In the study, the internal consistency of the composite EAI was good (α = .86), but Greeno et al. did not report the internal consistency for each component. In another study, Raynor and Hicks (2019) used the 22-Item EAI to examine the relationship of the components of empathy and compassion fatigue and maladaptive coping in a sample of Australian registered migration agents (N = 188). Raynor and Hicks reported that the internal consistency of the components of the 22-Item EAI ranged from α = .63 to α = .75, but they did not report the specific Cronbach's alpha values for each component. In a third study in which researchers used the 22-Item EAI as the measure of empathy, Radeka and Hicks (2020) explored the role of empathy in facilitating positive outcomes in Australian migration agents who had been exposed to vicarious trauma through their work with migrants. In the study, the internal consistency of the composite 22-Item EAI was good (α = .88), but the internal consistency of each component was not reported.

Greeno et al. (2018) assessed the concurrent validity of the 22-Item EAI in a correlation analysis of the EAI components and the TEQ (Spreng et al., 2009). Greeno et al. (2018) found a statistically significant moderate relationship (r = .56, p < .001) between the total TEQ score and the total EAI score. Additionally, moderate positive correlations were found between the TEQ and affective response component (r = .59) and affective mentalizing component (r = .50). Greeno et al. reported low and low-moderate correlations for the total TEQ score and the

emotion regulation component (r = .09), the self-other awareness component (r = .37), and the perspective taking component (r = .46).

The Interpersonal and Social Empathy Index

The first published use of the 22-Item EAI in the literature was in a study in which Segal et al. (2013) conducted a CFA study to develop an instrument to measure both interpersonal empathy and social empathy using one instrument. Segal et al. combined the 22 items of the five-component version of the EAI with 10 items from the previously validated 18-item Social Empathy Index (Segal et al., 2012) to construct the Interpersonal and Social Empathy Index (ISEI). The researchers invited 725 undergraduate students to complete the 32-item ISEI via an online survey in the fall of 2012. Of the 725 undergraduate students invited to participate, 464 students completed the survey (64% response rate). After Segal et al. excluded the cases with missing data, the final sample comprised 450 students. The mostly female sample (66% female, 33.8% male, and 0.2% other) ranged in age from 18 to 61 years (M_{age} = 23 years, SD = 5.69 years). Participants used the 6-point Likert scale from the 22-Item EAI (1 = *never* to 6 = *always*) to rate how closely the 32 items of the ISEI indicated their beliefs or emotions.

The ISEI (Segal et al., 2013) included seven components according to the two instruments comprising the instrument (i.e., the EAI and the Social Empathy Index). The interpersonal empathy portion of the index contained the 22-Item EAI with five components: affective response (five items), self-other awareness (four items), perspective taking (five items), emotion regulation (four items) and mentalizing (four items). The social empathy portion comprised the Social Empathy Index (Segal et al., 2012) with two components: contextual understanding (five items) and macro perspective taking (five items).

Segal et al. (2013) divided the study's total sample (N = 450) into two subsamples (n =

214 and n = 236) to conduct an EFA first on an independent sample to establish the underlying factor structure of the ISEI and then a CFA on a second independent sample to confirm the factor structure that emerged from the EFA. Segal et al. used SPSS version 21 to conduct the EFA using maximum likelihood extraction with a fixed number of factors (i.e., seven, based on the number of components in the original two instruments) and orthogonal rotation using data from the first subsample. The analysis revealed a four-component solution comprising 15 items. Segal et al. labeled each component according to the interpreted relationship of the items comprising each component. Table 1 presents a summary of the four-component solution and the item origin and the number of items for each component.

Table 1

The Four Components of the Interpersonal and Social Empathy Index and the Item Origin and Number of Items Comprising Each Component After Exploratory Factor Analysis

Name of Component	Item Origin (Number of the Items)
macro perspective taking	SEI contextual understanding (2)
	SEI macro perspective taking (3)
cognitive empathy	EAI perspective taking (1)
	EAI affective mentalizing (2)
	EAI self-other awareness (1)
self-other awareness	EAI self-other awareness (2)
	EAI affective mentalizing (1)
affective response	EAI affective response (3)

Note. SEI = Social Empathy Index; EAI = Empathy Assessment Index

Segal et al. (2013) used Cronbach's alpha to evaluate the internal consistency of the 15 items (α = .85) and of the four components. Segal et al. found acceptable alpha values for macro perspective taking (α = .77) and cognitive empathy (α = .76) and questionable alpha values for

self-other awareness (α = .69) and affective response (α = .64).

Segal et al. (2013) treated the data as categorical or ordinal data and conducted a CFA using Mplus version 7 and the weighted least squares estimator to evaluate the four-component structure of the 15 retained items. Using the data from the second subsample (n = 236), Segal et al. examined three hypothesized models: a single factor model, an uncorrelated four-component model, and a correlated four-component model. Segal et al. assessed the internal consistency for the four components in the second subsample using Cronbach's alpha and again found questionable internal consistency for self-other awareness (α = .66) and affective response (α = .60) and acceptable alpha values for macro perspective taking (α = .77) and cognitive empathy (α = .75).

Segal et al. (2013) used the following indices and standards of good fit to assess the model fit: NC (≤ 2.00), CFI (≥ .95), WRMR (< .95), and RMSEA (≤ .06 to .08 with a 90% confidence interval). The correlated four-component model demonstrated good fit and was the best fit of all the models: χ^2 (84, N = 236) = 162.59, p < .001; CFI = .96; WRMR = .78; RMSEA = .06 [.05, .08]. Segal et al. determined the model of the ISEI to be a four-component correlated model comprising 15 items. Eleven of the items originated in the 22-Item EAI.

Swedish-EAI

In 2015, Miguel Inzunza translated the 22-Item EAI to develop a Swedish version of the EAI to measure empathy. After using a back-translation technique to translate 50 items from an earlier version of the EAI (Lietz et al., 2011) and the 22-Item EAI into Swedish, Inzunza (2015) created a 25-item Swedish version of the EAI that included all items from the 22-Item EAI and three items from the earlier version of the EAI. Inzunza included the items from the earlier version of the index to address translation issues. The Swedish version comprised five

components: affective response (seven items), self-other awareness (four items), perspective taking (six items), emotion regulation (four items), and affective mentalizing (four items). Inzunza kept the 6-point Likert scale of the English versions of the EAI in the Swedish-EAI.

In a sample of 340 undergraduate students, Inzunza (2015) administered the Swedish-EAI in a university classroom using paper questionnaires. The university students, ranging in age from 20 to 41 years (M_{age} = 25.1 years, SD = 3.8 years) completed the questionnaire, which had been described to the students as an instrument to measure aspects of human relationships, which followed Segal et al.'s (2017) suggestion and procedure to reduce social desirability bias.

Inzunza (2015) analyzed the factor structure of the Swedish version of the EAI data by conducting a CFA with maximum likelihood estimation. Inzunza used pre-specified cutoff values for the fit indices to assess the fit of the models. The indices and cut-off values used were the chi-square index, CFI ($\geq$ .90), RMSEA ($\leq$ .08), and the SRMR($\leq$ .08).

The results of a CFA using data from 330 complete questionnaires indicated that the proposed five-component structure needed to be modified. A correlation analysis indicated that the perspective taking and affective mentalizing subscales were significantly correlated with a standardized correlation coefficient of .83 (Inzunza, 2015). Inzunza suspected that the perspective taking subscale and the affective mentalizing subscale were measuring the same subconstruct rather than two distinct but related constructs. Therefore, Inzunza divided the total sample into two subsamples and conducted an EFA and an EFA within a CFA framework using data from the first subsample (n = 116) and a CFA using data from the second, independent subsample (n = 214).

Inzunza (2015) conducted an EFA with principal axis factoring with oblique rotation to allow for correlated factors using the first subsample's (n = 116) data. The scree plot and parallel

tests indicated that only four of the five proposed factors should be extracted; in addition, five items were excluded from further analyses considering they had low communalities with the other items (all five items originated from the 22-Item EAI). Next, Inzunza conducted an EFA within a CFA framework also using the data from the first subsample to determine which of the 19 retained items did not fit the model. Inzunza selected items as anchors for each of four subfactors: perspective taking, affective response, emotion regulation, and self-other awareness. The four-component model provided good-to-acceptable fit to the data: χ^2 (101) = 157.61, p < .01, CFI = .95, RMSEA = .07, 90% CI [.05, .09], SRMR = .05. In the model, all four affective mentalizing items loaded on the perspective taking factor with factor loadings of .86, .75, .48, and .44. One perspective taking item from the 22-Item EAI was excluded from further analysis because it loaded on the self-other awareness factor rather than on the perspective taking factor, the component it had been intended to measure.

Inzunza (2015) next used data from the 18 remaining items, which included only 15 items from the 22-Item EAI, in a separate CFA using the second subsample (n = 214). Inzuna (2015) reported that the four-component model using data from the second subsample had an "acceptable fit to the data but no more" (p. 247). The results of the fit indices were as follows: χ^2 (129) = 281.66, p < .01, CFI = .90, RMSEA = .07, 90% CI [.06, .09], SRMR = .07. The internal consistency of the four-component, 18-item scale was α = .80.

Table 2 presents a summary of the components and items of the final version of the Swedish-EAI comprising four components and 18 items. Seven items from the 22-Item EAI were problematic in the Swedish version: two items each from perspective taking, self-other awareness, and affective response and one item from emotion regulation (Inzunza, 2015). In all, only 15 items from the English, 22-Item version of the EAI were retained (i.e., all four affective

mentalizing items, three of the five perspective taking items, three of the four emotion regulation items, and two of the four self-other awareness items). Only 10 of the retained items from the 22-Item EAI loaded on the factors they were intended to measure.

Table 2

The Components of the Swedish-Empathy Assessment Index and the Item Origin and Number of Items of Each Component With Internal Consistency

Name of Component	Item Origin (Number of the Items)	Cronbach's Alpha
perspective taking	EAI-affective mentalizing (4) EAI-perspective taking (2) Pilot EAI-imagining from fictional characters (1)	.81
affective response	EAI-affective response (3) Pilot EAI-affective response ability (2)	.72
emotion regulation	EAI-emotion regulation (3)	.62
self-other awareness	EAI-perspective taking (1) EAI-self-other awareness (2)	.61

Note. EAI = the 22-Item Empathy Assessment Index; Pilot EAI = the earlier version of the Empathy Assessment Index comprising 50 items

Purpose of the Study

The results from Segal et al.'s (2013) study and Inzunza's (2015) study suggest that affective mentalizing may not be measuring a distinct and separate component. In both studies, the affective mentalizing items loaded on the same component as items intended to measure either perspective taking or self-other awareness. In the Inzunza (2015) study, the four affective mentalizing items from the 22-Item EAI loaded on the perspective taking component along with

two items from the perspective taking component and an item related to imagining from fictional characters. Also, in the Segal et al. (2013) study, three of the four affective mentalizing items loaded on components with items associated with either perspective taking or self-other awareness rather than on a distinct component. The pattern of loadings may indicate that the affective mentalizing items may not be measuring a unique fifth component in the 22-Item EAI as Segal et al. (2017) theorized.

Affective mentalizing may theoretically be a separate component of empathy as the SCN conceptualization suggests; however, the affective mentalizing items of the EAI may not have discriminant validity as they are currently written. Inzunza (2015) hypothesized that differentiating between imagining the emotions of another person, as in affective mentalizing, and imagining the perspective of another person may be difficult to achieve using items on a self-report instrument.

The results of Inzunza's (2015) study may reflect the problems that occur when researchers translate an instrument from one language to another language. The loading of the affective mentalizing items with perspective taking items in the Swedish version of the EAI may be due to the translation process rather than issues with the instrument's factor structure. Inzunza acknowledged that the translation process might have introduced slight changes in the meaning of words that may have obscured the distinction between perspective taking and affective mentalizing. The affective mentalizing items, therefore, may demonstrate discriminant validity in the English version of the 22-Item EAI but not in the Swedish version of the EAI.

However, translation was not a factor in Segal et al.'s (2013) study in which the affective mentalizing items loaded on the same component as perspective taking; Segal et al. labeled that component cognitive empathy. Also, an affective mentalizing item in Segal et al.'s study loaded

on the same component as the self-other awareness items. Regarding that loading, Segal et al. determined that, indeed, the affective mentalizing item was related to self-other awareness.

These results reveal that the affective mentalizing component has demonstrated inconsistencies in both the English version of the EAI (Segal et al., 2017) as well as the Swedish version of the EAI (Inzunza, 2015). Considering that the results of a CFA of the English version of the 22-Item EAI do not appear in the literature, a CFA should be conducted to test the factor structure of the proposed five-component model of the EAI. Also, because the samples used in the validation studies of the EAI, except for the known-groups study, have been drawn from university student populations with a mean age less than 25 years, a sample with a higher mean age drawn from a community population has the potential to expand the understanding of the components of empathy across a wider range of ages.

The study's purpose was to discover if the factor structure of the 22-Item EAI is a correlated five-component model as proposed by Segal et al. (2017).

III. METHODOLOGY

The purpose of the study was to determine whether the factor structure of the 22-Item EAI in a diverse community sample of adults is a correlated five-component model as proposed by the instrument's developers. A CFA (Jöreskog, 1969) was used to evaluate the hypothesized model. A CFA is a statistical technique used to confirm the hypothesized theoretical relationships of latent (i.e., unobserved) variables and observed variables (i.e., items on a scale; Schreiber et al., 2006) and is the appropriate statistical procedure to confirm or reject an a priori hypothesized model (Meyers et al., 2017; Schreiber et al., 2006; Tabachnick & Fidell, 2019). An a priori theoretical model of the 22-Item EAI was examined to compare its covariance matrix of sample data to the estimated population covariance matrix (Schreiber et al., 2006). The model was considered to have a good fit if the difference between the observed matrix and the estimated matrix was minimal and consistent with the data (Kenny, 2020). Several goodness-of-fit indices were used to evaluate the data's compliance with the model.

Description of Methodology

Research Design

The current study was non-experimental, quantitative, and cross-sectional. Survey methods were used to collect data to address a single research question: Is the structure of the 22-Item EAI a correlated five-component model as proposed by the instrument's developers?

Participants and Procedures for Sampling and Data Collection

After approval of the Institutional Review Board at Southeastern University was received, email and social media were used to recruit a sample of convenience from the general population of adults nationwide during August and September 2020 using a snowball sampling technique (see Appendix B for a sample script used for recruiting respondents). The survey was open to anyone 18 years or older, and participation in the study was voluntary and anonymous. Respondents provided no identifying information and received no compensation for participating. The first page of the survey served as the informed consent form and provided information about the study and the principal investigators' identities (see Appendix C). The respondents were informed of their right to exit the survey at any time. Respondents provided consent to participate in the survey by clicking on an icon to access the survey's main content.

A preview of the dataset conducted at the end of August 2020 revealed an overwhelming number of female respondents. Therefore, a replica of the original survey was re-posted using the title "Human Relations Survey for Men," and the snowball sampling technique (i.e., emails and social media) was repeated to solicit responses specifically from males by sending email requests to male friends, colleagues, and relatives during September 2020. The email informed the recipients of the lack of male respondents and the need to encourage males to participate in the survey. A response rate was not computed considering that recruiting participants via snowball sampling causes indeterminable response rates.

The web-based survey—hosted on SurveyMonkey—included nine demographic items and the 22-Item EAI (see Appendix A). Replicating the method used by the instrument's developers during the validation studies of the EAI, the instrument was titled "Human Relations Survey" or "Human Relations Survey for Men" to avoid using the term "empathy" to minimize

social desirability bias (Segal et al., 2017). The 22 EAI items were presented before the demographic items to mitigate the loss of EAI data caused by answer fatigue. Respondents completed the survey between five and seven minutes and indicated how closely the EAI items characterized their assessment of themselves using a 6-point Likert scale ranging from 1 (*never*) to 6 (*always*).

Instrumentation

The instrument used in the study was the 22-Item EAI (see Appendix A), a self-report questionnaire designed to measure empathy based on an SCN conceptualization of empathy. Refer to Chapter 1 and Chapter 2 for an overview of the SCN conceptual framework of empathy, which forms the basis of the EAI items. Figure 1 (see Chapter 1) presents a visual depiction of the SCN conceptual framework. According to the SCN conceptualization, empathy consists of one bottom-up process—affective response—and four top-down processes—self-other awareness, perspective taking, affective mentalizing, and emotion regulation. Table 3 presents the number of items used to measure each component, a description of each component, and an example survey item. Composite empathy scores can range from 22 to 132, and the component scores can range from as low as 4 to as high as 30. Composite mean scores and component mean scores can range from 1 to 6. Higher scores indicate higher levels of interpersonal empathy and higher levels of each component of empathy (Segal et al., 2017).

Validity of the EAI

Two EAI components of the pilot version of the EAI (Gerdes et al., 2011) demonstrated concurrent validity with two components from Davis's IRI in a sample of university students (n = 312). Davis's IRI has been reported to be "the most common psychometric tool for measuring an individual's empathy" (Chrysikou & Thompson, 2016, p. 769) and is often used in concurrent

Table 3

Descriptions of the Five Interpersonal Empathy Components with Example Survey Items and Number of Items for Each Component

Component (Number of items)	Description (Survey Item)
Affective Response (5 items)	the automatic and unconscious neural response to an observed environmental trigger; the mirroring of the emotions of another person ("When I see someone being publicly embarrassed, I cringe a little.")
Self-Other Awareness (4 items)	the cognitive ability to differentiate personal emotions and experiences from the emotions and experiences of another person ("I can tell the difference between someone else's feelings and my own.")
Perspective Taking (5 items)	the cognitive ability to consider intentionally what another person might experience in a situation ("I can imagine what it's like to be in someone else's shoes.")
Affective Mentalizing (4 items)	the cognitive processing of inferring the meaning of another person's emotional or mental state as a result of an environmental trigger or by imagining the experience of another person ("I am good at understanding other people's emotions.")
Emotion Regulation (4 items)	the cognitive ability for a person to regulate the intensity and duration of personal emotions ("Emotional stability describes me well.")

Note. Sample items come from *Assessing Empathy* by E. Segal, K. Gerdes, C. Lietz, A. Wagaman, and J. Geiger, 2017, Appendix B.

validity studies of instruments measuring empathy. The EAI's affective response component was significantly correlated with the IRI's empathic concern component ($r = .48$, $p < .001$), and the perspective taking component of the EAI was significantly correlated with the IRI's perspective taking component ($r = .75$, $p < .001$; Gerdes et al., 2011).

Lietz et al. (2011) analyzed the concurrent validity of the emotion regulation component and the self-other awareness component of the 17-item EAI—the second version of the

instrument—in a test-retest validity study in a subsample of university students (n = 429). The emotion regulation component of the 17-item EAI demonstrated a moderately strong correlation (r = .51, p = .001) to nine items of the Cognitive Emotion Regulation Questionnaire (Garnefski & Kraaji, 2006), a validated measure of emotion regulation (Lietz et al., 2011). Lietz and her colleagues also analyzed the correlations of the self-other awareness and emotion regulation components of the 17-item EAI to eight items of the Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003). According to Lietz et al. (2011), the MAAS is a validated scale "designed to measure a person's open or receptive awareness and attention to what is occurring in the present" (p. 109). Lietz et al. stated that lower scores on the MAAS indicate more mindfulness. Therefore, Lietz and her colleagues hypothesized that scores on the emotion regulation and self-other awareness components of the 17-item EAI would be negatively correlated to the MAAS composite score. As hypothesized, emotion regulation component scores (r = −.27, p = .001) and self-other awareness scores (r = −.40, p = .001) were negatively correlated to the MAAS composite score.

Gerdes and her colleagues (2012) conducted a known-groups study to assess the criterion-related validity of the 20-item EAI, the third version of the EAI. The researchers hypothesized that treatment groups comprising service recipients (i.e., sexual offenders, domestic violence offenders, and individuals with anger management issues) would have lower composite EAI and component scores (i.e., affective response, perspective taking, self-other awareness, and emotion regulation) compared to the service providers. The results of a multi-level regression analysis controlling for demographic items were mixed. Although the service providers had higher mean EAI composite scores than the service recipients, as well as higher EAI mean component scores than each of the three recipient groups, the difference in composite EAI scores

was statistically different for only two of the three service recipient groups (β= −4.22, *SE* = 1.17, *p* = .037 and β = −7.83, *SE* = .86, *p* = .003). Additionally, service recipient groups had lower mean component scores than service providers. Still, regression analyses revealed that no service recipient group had statistically significant lower affective response scores or perspective taking scores than service providers. However, one service recipient group had statistically significant lower emotion regulation scores (β = −3.08, *SE* = .59, *p* = .014) and self-other awareness scores (β = −1.61, *SE* = .46, *p* = .041) compared to the service providers. Though the results were mixed, Gerdes and her colleagues considered the results supportive of criterion validity of the composite scores of the 20-item EAI.

In a validation study of the Social Empathy Index (Segal et al., 2012), which includes the 20-item EAI, Segal et al. correlated the scores of the four EAI components (i.e., affective response, perspective taking, self-other awareness, and emotion regulation) and the composite 20-item EAI scores of university students (*n* = 300). The researchers found that each of the mean component scores was significantly correlated to the composite 20-item EAI score in the sample; Pearson's *r* coefficients ranged from *r* = .66 to *r* = .83, *p* < .01.

Finally, Greeno et al. (2018) conducted a correlation study of the composite scores of the 22-Item EAI—the instrument used in the current study—and the composite scores of the TEQ (Spreng et al., 2009). The TEQ is a valid "unidimensional measure of empathy that perceives empathy as an emotional process and measures affective empathy" (Spreng et al., 2009, p. 177). Greeno et al. (2018) found a significant and moderate relationship (*r* = .56, *p* < .001) between the two instruments.

Reliability of the EAI

Inter-item correlations within factors, Cronbach's alpha, and correlations of test-retest

reliability have been used to establish the reliability of the multiple versions of the EAI during its development. Although reliability statistics were found for affective response, perspective taking, self-other awareness, and emotion regulation, no reliability statistics for the affective mentalizing component were found in the literature. However, Greeno et al. (2018) computed the internal reliability of the 22-Item EAI that included the affective mentalizing items ($\alpha = .86$). Analysis of the internal consistency of four EAI components (i.e., affective response, perspective taking, self-other awareness, and emotion regulation) in earlier versions of the EAI revealed significant, moderate correlations between components; Pearson's *r* correlation coefficients ranged from .32 to .58, $p < .01$ (Lietz et al., 2011). Table 4 presents the internal consistency results of the EAI components in three separate studies.

Unfortunately, no test-retest reliability data are available for the 22-Item EAI. However, reliabilities of earlier versions of the EAI (Gerdes et al., 2011; Lietz et al., 2011) demonstrated strong test-retest reliability across four component scores (i.e., affective response, self-other awareness, perspective taking, and emotion regulation). Significant Pearson's *r* correlations ranged from $r = .69$ to .77 ($p = .001$; Lietz et al., 2011).

Table 4

Internal Consistency Values of the Components of the Empathy Assessment Index in Three Studies

	Cronbach's Alpha		
Component	Study 1 Gerdes et al. (2011)	Study 2 Lietz et al. (2011)	Study 3 Segal et al. (2012)
Affective Response	.83	.84	.58
Self-Other Awareness	not available	.70	.64
Perspective Taking	.81	.82	.74
Emotion Regulation	.81	.72	.68

Data Analysis

The study was designed to answer a single research question: Is the structure of the 22-Item EAI a correlated five-component model as proposed by the instrument's developers? It was hypothesized that the factor structure of the 22-Item EAI is not a five-component model.

The data were exported from the web-based survey tool SurveyMonkey to an Excel spreadsheet. Responses to EAI items 5 and 10 were reverse scored before analyses. Likert-scale responses were treated as continuous data (Tabachnick & Fidell, 2019), and demographic data were coded. The Excel spreadsheet data were then exported to SPSS version 27 and Stata version 16.1 for further analyses. Intellectus Statistics software was used to verify the assumptions of normality and the CFA findings.

Preliminary Analyses

Missing Data

Before conducting a CFA using Stata version 16.1 to answer the research question, the data were screened and examined using SPSS version 27 to identify influential outliers and missing data. Multiple imputation analysis, expectation maximization, and Little's MCAR test were used to determine the level and randomness of missing data. Cases with missing values of the observed variables (i.e., the EAI item responses) were removed from the sample set before conducting further analyses considering that deleting the cases would not result in a substantial loss of cases (Tabachnick & Fidell, 2019). Thus, the imputation of data was unnecessary.

Outliers

Mahalanobis distances were compared with the quantiles of a χ^2 distribution (Newton & Rudestam, 2012), and box and whisker plots were visually inspected to identify influential outliers. Cases with influential outliers were removed from the sample set before further analyses

were conducted.

Sample Size

A common rule of thumb for determining a sufficient sample size is to have at least 300 observations (Comrey & Lee, 2013; Tabachnick & Fidell, 2019). Other authors use the ratio (*N*:*q*) of overall sample size (*N*) to the number of free parameter estimates (*q*; latent variable, indicator, variance, covariance, or any regression estimates) included in the model. On the lower end of the ratio, Bentler and Chou (1987) suggest that an acceptable *N*:*q* ratio is 5:1. The hypothesized model of the EAI has 54 free parameters. Therefore, following Bentler and Chou's rule, 270 cases were required to meet a ratio of five sample cases to one free parameter. To reserve independent data for future EFAs and CFAs, a subsample of 300 cases was randomly accessed from the final valid sample set ($N = 903$) after outliers and cases with missing values were deleted. A sample of 300 cases satisfied the minimum sample size to conduct a CFA according to the guidelines and rules of thumb suggested by multiple methodologists (Bentler & Chou, 1987; Field, 2013; Hu & Bentler, 1999, Tabachnick & Fidell, 2019).

Descriptive Analyses

Stata version 16.1 was used to analyze the demographic data of the entire sample and subsample using the following descriptive statistics: measures of frequency, central tendency, and dispersion. The percentages of participants' responses to the demographic items were calculated based on gender, age group, race, ethnicity, student status, the highest level of education, occupational category, and religious identification.

Research Question Analysis Using CFA

To determine whether the factor structure of the 22-Item EAI is a correlated five-component model as proposed by the instrument's developers, a CFA was conducted using Stata

version 16.1.

Assumptions of Normality

As previously mentioned, the Likert-scale responses were treated as continuous values (Tabachnick & Fidell, 2019). The mean composite, the mean component scores, and the standard deviations for the complete sample set and the subsample were computed. The internal consistency of the 22-Item, five-component version of the EAI was assessed using Cronbach's alpha. The between item correlations values were analyzed by examining the squared multiple correlations and calculating the determinant of the correlation matrix to determine whether two or more items were too highly correlated with each other (i.e., multicollinearity), which could cause problems during a CFA.

Univariate and multivariate normality (Schreiber et al., 2006; Tabachnick & Fidell, 2019) were evaluated using SPSS version 27. Univariate and multivariate normality were examined in the final valid sample and the randomly generated subsample using skewness and kurtosis values of each EAI item and the skewness and kurtosis values of the mean composite and component scores. The item means, component means, and composite means were evaluated by visually examining frequency histograms, box and whisker plots, probability (P-P) plots, and quantile (Q-Q) plots. Consistent with Curran et al.'s (1996) and George and Mallery's (2019) recommendations, normality of data was ascribed when skewness values were not beyond +/− 2, and kurtosis values were not beyond +/− 7.

Hypothesized Model

The hypothesized model of the 22-Item EAI is presented in Appendix D. The ovals represent the latent variables (i.e., affective response, perspective taking, self-other awareness, affective mentalizing, and emotion regulation), and the rectangles represent the measured, or

observed, variables (i.e., the 22 response items of the EAI). The regression lines connecting an oval to rectangles indicate a hypothesized direct effect, with the arrow's direction indicating the causal direction. The curved, bidirectional arrows connecting the ovals indicate the hypothesized correlation of the latent variables. The small circles represent the error variances for each measured variable. In the model, items 1, 7, 11, 16, and 21 are indicators of affective response; items 4, 6, 13, 15, and 19 are indicators of perspective taking; items 8, 14, 18, and 20 are indicators of self-other awareness; items 3, 9, 12, and 22 are indicators of affective mentalizing; and items 2, 5, 10, and 17 are indicators of emotion regulation. The five latent variables (i.e., the components) are hypothesized to covary with one another.

Model Estimation

A single model was examined—the five-component correlated model proposed by Segal et al. (2017). As per typical model specification, items were allowed to load only on their a priori target variables, with cross-loadings constrained to zero in the model (i.e., each measured variable was allowed to load on one latent variable only). Information maximum likelihood estimation—the most widely used method in CFA (Curran et al., 1996) and one that uses all available data during estimation without deletion—was used to estimate the model. The maximum likelihood estimation method was chosen because the continuous data from the large sample satisfied the multivariate normality assumptions. The maximum likelihood method aims to find "the model parameter estimates that maximize the probability of observing the available data if the data were collected from the same population again" (Brown & Moore, 2012, sec. 22.5, paragraph 5).

Examination of Fit Indices

After the initial analysis of the estimated model, the output was examined to assess the

model's fit. Model fit refers to the ability of a model to reproduce the data (Kenny, 2020). The chi-square statistic is the most popular statistic used to measure model fit (Meyers et al., 2017). A non-significant chi-square indicates a good fit; however, with large samples ($N > 250$), the chi-square value may be significant even in a good fitting model (Meyers et al., 2017). Therefore, in addition to the chi-square goodness-of-fit statistic, several global fit indices were evaluated to assess the model fit to the data and are reported in Chapter 4. The selection of fit indices and cut-off values for the study corresponded to the recommended cut-off values proposed by Hu and Bentler (1999) and match four of the goodness-of-fit standards and cut-off values used by Lietz et al. (2011) during the construction of the EAI. Although Lietz et al. used the WRMR, Stata version 16.1 does not compute a WRMR. Therefore, the SRMR was evaluated instead. Table 5 presents the fit indices and cut-off values used in the study to evaluate the model fit.

The internal reliability of the EAI items in the model was assessed using Cronbach's alpha. McDonald's omega was also calculated to determine the total mean score's reliability, given that omega has been considered a more optimal measure of reliability compared to Cronbach's alpha (Hayes & Coutts, 2020).

Model Modifications

The purpose of the study was to examine the factor structure of the 22-Item EAI to determine whether the five-component model fits the data in a community sample of adults. Identifying the best fitting or parsimonious model of the EAI was considered beyond the scope of the study. The analyses ended once the model fit was determined; however, modification indices and the R^2 values of the observed variables were examined to identify areas of strain. Post-hoc model modifications were not conducted, and a final model was not determined.

Table 5

Model Fit Indices and Cut-Off Values for Acceptable Fit and Good Fit

	Cut-Off Values	
Fit Statistic	Acceptable Fit	Good Fit
χ^2(df)	No cut-off value	a non-significant value indicates good fit
NC: χ^2/df	< 3.00	< 2.00
RMSEA [90% CI]	≤ .08	< .06
CFI	≥ .90 for acceptable fit	≥ .95 for good fit
TLI	≥ .90 for acceptable fit	≥ .95 for good fit
SRMR		≤ 0.08 for good fit

Note. χ^2 = chi-square; df = degrees of freedom; NC = normed chi-square statistic; RMSEA = root-mean-square error of approximation; CI = confidence interval; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean squared residual. The cut-off values of the NC according to Kline (2015). The cut-off values of RMSEA, CFI, TLI, and SRMR are according to Hu and Bentler's (1999) recommended values.

* $p < .001$

Ethical Procedures

Approval from the Institutional Review Board of Southeastern University was obtained before data collection. To limit social desirability bias related to the perceived assessment of empathy as a desirable trait, the instrument's name was not included in the online survey; instead, the survey was titled a "Human Relations Survey." Individuals who chose to respond gave informed consent, acknowledged that they were at least 18 years of age, and indicated that they freely and voluntarily agreed to participate in the study (see Appendix C). All data were anonymous, no individuals could be identified, and all responses were aggregated. Online

identifiers (i.e., IP addresses) were not collected by the online survey tool. The study's digital data were saved in password-protected laptop computers and will be deleted from all personal devices five years after the study has been completed.

Summary

Chapter 3 explained the research design and methodology utilized to evaluate the a priori five-component model of the 22-Item EAI in a diverse sample of adults within the general population. The chapter described the snowball sampling procedure and the validity and reliability of the 22-Item EAI. The preliminary analyses to ascertain the assumptions of normality and other requirements necessary for conducting a CFA using maximum likelihood estimation were described. The goodness-of-fit indices and cut-off values were identified and defined. Chapter 4 provides the results of the analyses.

IV. RESULTS

The purpose of the study was to determine whether the factor structure of the 22-Item EAI in a diverse community sample of adults is a correlated five-component model as proposed by the instrument's developers. To evaluate the hypothesized model, a CFA was conducted. A CFA is a statistical technique used to confirm the hypothesized theoretical relationships of latent (i.e., unobserved) variables and observed variables (Schreiber et al., 2006) and is the appropriate statistical procedure to confirm or reject an a priori hypothesized model (Meyers et al., 2017; Schreiber et al., 2006; Tabachnick & Fidell, 2019).

Software Used for Analyses

Missing data, outliers among cases, and internal validity were computed and the assumptions of normality were evaluated using SPSS version 27. Stata 16.1 was used to compute demographic descriptive statistics and to conduct a CFA to examine the hypothesized model of the 22-Item EAI.

Sampling Procedure

Snowball sampling generated 929 responses to the online survey hosted on SurveyMonkey. During the first collection period, 855 responses were collected. After the first collection of data, a preview of the data revealed that an overwhelming number of respondents were female. As a result, a second collector on SurveyMonkey was opened in September 2020 to solicit additional responses from male respondents. An additional 74 responses were collected.

Considering that recruiting participants via snowball sampling produces indeterminable response rates, a response rate was not computed.

Preliminary Analyses

Missing Data

Data from 929 response sets for the EAI items were examined for missing data. A multiple imputation analysis of missing data patterns revealed a completion rate of 99.85% (0.15% missing values, $n = 30$). Additionally, expectation maximization indicated a nearly intact data set with the missing data demonstrating randomness. Little's MCAR test was not significant, $\chi^2(306, N = 929) = 270.93$, $p = .93$, suggesting that values were missing entirely at chance. Although the percentage of missing data was low, the 21 cases with missing data were excluded from further analyses considering that deleting the cases would not result in a substantial loss of cases, and distortions of the sample were unlikely to occur (Tabachnick & Fidell, 2019). Removing the cases with missing data eliminated the need to impute data.

Outliers

After removing the 21 cases with missing data, the remaining cases ($N = 908$) were evaluated for univariate and multivariate outliers through the visual interpretation of box and whisker plots. Five cases were identified as having at least one influential outlier on an EAI item and were excluded from further analyses. The total valid sample was 903 cases. A subsample of 300 cases was generated from the total valid sample.

Influential points were identified in the subsample data ($n = 300$) by calculating Mahalanobis distances and comparing them with the quantiles of a χ^2 distribution (Newton & Rudestam, 2012). Six observations were detected as outliers. However, a visual examination of box and whisker plots indicated that the six observed outliers were not influential, and the data

were retained.

Sample Size

Factor analyses require a sample large enough to detect a poor fitting model (Kenny, 2020). After examining the data for missing values and influential outliers, a total of 903 cases remained with no influential outliers and no missing data. A random subsample (n = 300) was generated from the final sample (N = 903) using the unbiased select cases menu in SPSS version 27 and was used for further analyses. Considering the chi-square goodness of fit test is overly sensitive for models with large samples (Brown & Moore, 2012; Kenny, 2020), 300 cases from the original sample of 903 was thought an appropriate number of cases that would provide both sufficient power to detect a poor fitting model (Kenny, 2020) and a more accurate chi-square goodness of fit value. Additionally, the random selection method allows for future EFAs and subsequent CFAs using the same population.

Moreover, a sample size of 300 satisfies Nunnally and Bernstein's (1994) recommendation to have 10 or more participants per item considering that the EAI has 22 items, which means a sample size of at least 220 would be a sufficient sample size. The participant to free parameter ratio for the analysis was approximately 5.6 to 1, where the sample size was 300, and the number of included variables was 54. According to the N:q ratio rule-of-thumb of Bentler and Chou (1987), the given sample size was sufficient for a CFA.

Descriptive Analyses

The snowball sampling strategy yielded responses from a diverse sample according to age, student status, the highest level of education, and occupational category. Table 6 summarizes the descriptive statistics for the total valid sample (N = 903) and, in parentheses, the subsample (n = 300). Valid percentages are based on the number of responses obtained for the demographic

item; missing values in each category were not included in the frequency calculations and percentages.

Table 6

Descriptive Statistics for Demographic Items for Total Valid Sample and Randomly Generated Subsample

	Total Sample (N = 903)		Subsample (n = 300)	
Category	*n*	Valid %	*n*	Valid %
Gender				
Male	189	21.95	60	20.83
Female	670	77.82	227	78.82
Other	2	0.23	1	0.35
Age Group				
19-29 years	154	18.12	50	17.54
30-39 years	174	20.47	56	19.65
40-49 years	172	20.24	61	21.40
50-59 years	204	24.00	64	22.46
60+ years	146	17.18	54	18.95
Race				
Black	35	4.07	12	4.18
White	781	90.92	258	89.90
Two or more races	18	2.10	9	3.14
Other	10	1.16	2	0.70
Ethnicity				
Hispanic or Latino/a	46	5.43	7	2.46
Non-Hispanic or Latino/a	741	87.49	252	88.73
Other	60	7.00	25	8.80
Highest Level of Education				
High School/GED	148	17.33	47	16.55
Undergraduate Degree	317	37.11	99	34.86
Graduate Degree	376	44.03	134	47.19
Certificate/trade school/license	10	1.17	2	0.70
Other	3	0.35	2	0.70
Student Status				
Non-student	666	77.44	224	77.78
Undergraduate	37	4.30	10	3.47
Master’s	52	6.05	16	5.56
Doctoral	105	12.21	38	13.19

	Total Sample (N = 903)		Subsample (n = 300)	
Category	*n*	Valid %	*n*	Valid %
Occupations				
Education	304	35.43	100	34.97
Health Care	103	12.00	28	9.79
Business/Finance	62	7.23	27	9.44
Retired	50	5.83	20	6.99
Engineering/Technology	32	3.73	15	5.24
Social Services	35	4.08	13	4.55
Public Administration	35	4.08	9	3.15
Other	237	27.62	74	25.87
Religious Identification				
Non-Christian	150	17.44	53	18.47
Christian	710	82.56	234	81.53

Note. American Indian, Asian, Native Hawaiian or other Pacific Islander each represented less than 1% of the sample and subsample. The random sample had no Native Hawaiian or Other Pacific Islander. Valid percent is based on the number of respondents who provided a response for the demographic item. Unknown responses are not included in the calculations. Analyses were computed using Stata 16.1.

A wide range of ages was represented in the total sample (N = 903). Less than 20% of the respondents were younger than 30 years old, and ages ranged from 19 to 84 years. The random sample (n = 300) comprised adults with ages ranging from 19 to 78 years. See Table 7 for a summary of the age ranges, means, and standard deviations of all genders, males only, and females only in the total sample and subsample.

The sample comprised mostly non-students (77.44%). Respondents also were predominantly well-educated; over 81% of respondents reported at least an associate degree as the highest level of education. Refer to Table 6 for a full description of student status and the highest level of education.

Table 7

Descriptive Statistics for Age in Years and Genders of Respondents in the Total Sample and Subsample

Item	Minimum Age	Maximum Age	*M*	*SD*
All Genders				
$n = 848$	19	84	44.98	14.37
($n = 283$)	(19)	(78)	(45.39)	(14.37)
Males				
$n = 188$	19	76	46.59	14.97
($n = 60$)	(20)	(75)	(47.67)	(14.81)
Females				
$n = 657$	20	84	44.59	14.14
($n = 222$)	(20)	(78)	(44.89)	(14.15)

Note. The random sample results are in parentheses.

The respondents represented a variety of occupations. Over 27 occupation categories were represented in the sample set. The top seven occupation categories are presented in Table 6. Having a diverse representation of occupations, education levels, and ages provides important information regarding the use of the 22-Item EAI in the general population.

Particular limitations within the sample of respondents are noteworthy. First, fewer males (21.95%) than females (77.82%) were represented in the sample. Second, the sample overrepresents the White race (90.92%), the non-Hispanic or Latino/a ethnic population (87.49%), and the Christian perspective (82.56%).

Confirmatory Factor Analysis

The EAI used in the study comprised 22 items to measure five theoretical components of empathy: affective response (five items), self-other awareness (four items), perspective taking (five items), affective mentalizing (four items), and emotion regulation (four items). For a description and an example item for each component, refer to Table 3 in Chapter 3. Respondents used a 6-point Likert-type scale (1 = *never* to 6 = *always*) to indicate how closely each item

characterized their assessment of themselves. Two items for emotion regulation (i.e., items 5 and 10) were reverse scored before calculating the mean scores. Table 8 presents the descriptive statistics for each item in the complete data set ($N = 903$) and the subsample data set ($n = 300$). Subsample values are in parentheses.

Table 8

*Descriptive Statistics for EAI Items for Total Valid Sample (*N = *903*) *and Randomly Generated Subsample (*n = *300)*

Item	Minimum Score	Maximum Score	*M*	*SD*	Skewness	Kurtosis
1	3	6	5.38 (5.43)	0.76 (0.67)	−1.17 (−0.88)	1.09 (0.22)
2	1	6	4.45 (4.53)	0.94 (0.94)	−0.57 (−0.67)	−0.02 (0.37)
3	1 (2)	6	4.61 (4.69)	0.89 (0.85)	−0.65 (−0.58)	0.39 (0.23)
4	2	6	4.70 (4.75)	0.87 (0.88)	−0.31 (−0.40)	−0.41 (−0.32)
5	1	6	4.13 (4.14)	0.91 (0.93)	−1.08 (−1.20)	1.65 (1.90)
6	1	6	4.72 (4.76)	0.93 (0.93)	−0.64 (−0.65)	0.54 (0.53)
7	2	6	5.27 (5.32)	0.91 (0.86)	−1.32 (−1.33)	1.66 (1.35)
8	2 (3)	6	5.02 (5.07)	0.89 (0.84)	−0.77 (−0.61)	0.34 (−0.26)
9	1	6	4.56 (4.52)	0.87 (0.89)	−0.43 (−0.52)	−0.11 (0.38)
10	1	6	4.79 (4.88)	0.90 (0.90)	−1.11 (−1.09)	2.32 (2.04)
11	1	6	4.09 (4.13)	1.52 (1.55)	−0.35 (−0.41)	−0.94 (−0.91)
12	1	6	4.31 (4.27)	0.99 (1.05)	−0.37 (−0.38)	−0.15 (−0.20)
13	1 (2)	6	4.33 (4.35)	0.95 (0.95)	−0.34 (−0.25)	−0.19 (−0.57)
14	1	6	4.92 (4.89)	0.89 (0.90)	−0.60 (−0.66)	0.11 (0.53)
15	2	6	4.82 (4.82)	0.82 (0.83)	−0.35 (−0.37)	−0.30 (−0.17)
16	2 (3)	6	5.02 (5.12)	0.97 (0.89)	−0.83 (−0.83)	0.06 (−0.05)
17	1	6	3.66 (3.72)	1.01 (1.01)	0.07 (−0.02)	−0.63 (−0.62)
18	1 (2)	6	4.23 (4.29)	1.12 (1.16)	−0.30 (−0.32)	−0.70 (−0.79)
19	2	6	4.66 (4.70)	1.02 (0.97)	−0.46 (−0.37)	−0.45 (−0.54)

Item	Minimum Score	Maximum Score	*M*	*SD*	Skewness	Kurtosis
20	1	6	3.89 (3.85)	1.00 (1.00)	0.12 (0.13)	−0.54 (−0.43)
21	2 (3)	6	5.14 (5.14)	0.88 (0.87)	−0.91 (−0.85)	0.44 (0.77)
22	2	6	4.74 (4.77)	0.82 (0.84)	−0.51 (−0.53)	0.07 (−0.00)

Note. Subsample values are in parentheses. If the minimum score of the total sample was the same minimum score for the subsample, only one score is given. Analysis performed using SPSS version 27 software.

Research Question and Hypothesis

One research question was asked in the study: Is the structure of the 22-Item EAI a correlated five-component model as proposed by the instrument's developers?

H_a: The factor structure of the 22-Item EAI is not a five-component model.

To answer the research question, a CFA was conducted using data obtained from a diverse sample of adults within the general population to determine whether the latent variables (i.e., affective response, self-other awareness, perspective taking, affective mentalizing, and emotion regulation) adequately described the data. Maximum likelihood estimation was performed to determine the standard errors for the parameter estimates. Tabachnick and Fidell's (2019) five-step analysis procedure was followed throughout the analysis process.

Assumptions of Normality

Before the proposed model was estimated, the data were examined in SPSS version 27 and Intellectus Statistics software to assess univariate and multivariate normality, univariate and multivariate outliers, internal consistency, and multicollinearity. Likert-scale responses were treated as continuous variables (Tabachnick & Fidell, 2019). Missing data and outliers were addressed in the preliminary analyses and were reported earlier in the current chapter. The

sample and subsample had no missing data or influential outliers.

Univariate and Multivariate Normality

The assumptions of univariate and multivariate normality (Schreiber et al., 2006; Tabachnick & Fidell, 2019) were first evaluated using SPSS version 27. Levels of skewness and kurtosis did not extend beyond +/− 2 for skewness or +/− 7 for kurtosis (Curran et al., 1996; George & Mallery, 2019). Refer to Table 8 for descriptive statistics of the 22 items and Table 9 for the psychometric properties of the composite EAI and of each component. Both tables present the skewness and kurtosis values and the range, mean, and standard deviation for the total sample and the subsample data. A visual inspection of frequency histograms, box and whisker plots, P-P plots, and Q-Q plots revealed a normal distribution of all variables. Additionally, Intellectus Statistics software was used to calculate the squared Mahalanobis distances for the data, and the distances were plotted against the quantiles of a chi-square distribution (DeCarlo, 1997; Field, 2017). Considering that the points in the scatterplot formed a relatively straight line, normality of data was assumed.

Internal Consistency Analyses

An internal consistency analysis was performed in SPSS version 27 on the 22-Item, five-component EAI using Cronbach's alpha for the component means and McDonald's omega for the composite mean in both the total sample (N = 903) and the random subsample (n = 300). Cronbach's alphas ranged from .60 to .79 for the components. McDonald's omega value reflected an excellent level of internal consistency for the composite EAI in the total sample (ω = .84) and the subsample (ω = .85). Table 9 summarizes the psychometric properties for the 22-Item EAI composite and component scores for the total valid sample (N = 903) and subsample (n = 300). See Appendix E for a side-by-side presentation of the internal consistency of each

component in the current study and the validation studies conducted by Gerdes et al. (2011), Lietz et al. (2011, and Segal et al. (2012). Mean composite scores ranged from 3.18 to 5.82. Mean component scores ranged from 1.75 to 6.00. Higher mean scores indicate greater levels of empathy.

Table 9

*Psychometric Properties for the 22-Item EAI Composite and Component Scores in the Total Valid Sample (*N = *903*) *and Subsample (*n = *300)*

	Minimum Score	Maximum Score	*M*	*SD*	Skewness	Kurtosis
Composite ω = .84 (.85)	3.18 (3.18)	5.82 (5.82)	4.61 (4.64)	0.46 (0.47)	−0.35 (−0.25)	−0.02 (−0.14)
AR α = .63 (.63)	2.40 (3.40)	6.00 (6.00)	4.96 (5.02)	0.66 (0.65)	−0.56 (−0.48)	0.10 (−0.48)
SOA α = .60 (.65)	2.50 (2.50)	6.00 (6.00)	4.52 (4.52)	0.66 (0.69)	−0.33 (−0.29)	−0.15 (−0.19)
PT α = .68 (.71)	2.40 (2.40)	6.00 (6.00)	4.65 (4.68)	0.61 (0.62)	−0.32 (−0.36)	0.67 (0.17)
AM α = .78 (.79)	2.00 (2.30)	6.00 (6.00)	4.56 (4.56)	0.69 (0.71)	−0.48 (−0.46)	0.06 (−0.15)
ER α = .70 (.67)	1.75 (1.80)	6.00 (6.00)	4.25 (4.32)	0.68 (0.67)	−0.48 (−0.54)	0.42 (0.79)

Note. Subsample (*n* = 300) values are in parentheses. No missing data in total sample or subsample. Components: AR = affective response; SOA = self-other awareness; PT = perspective taking; AM = affective mentalizing; ER = emotion regulation. Scores could range from 1-6.

The results indicate questionable internal consistency for self-other awareness and affective response, acceptable internal consistency for emotion regulation and perspective taking,

and good internal consistency for affective mentalizing by conventional standards (George & Mallery, 2019). Alpha levels to determine whether a higher level of reliability could be achieved if an item was eliminated were not evaluated; the study's aim was to examine the 22-Item EAI without modifications.

Multicollinearity

Variables suitable for factorization should be correlated with one another. However, problems in a CFA result when variables are too highly correlated. Variables that exhibit high multicollinearity should either be removed from the analysis or combined as a composite variable. To assess multicollinearity, the squared multiple correlations were inspected, and the determinant of the correlation matrix was calculated. Any variable with an $R^2 > .90$ can contribute to multicollinearity in the CFA model (Kline, 2015). No variables had an $R^2 > .90$. Another assessment for multicollinearity is to assess the determinant of the data's correlation matrix. A determinant that is ≤ 0.00001 indicates that multicollinearity exists in the data (Field, 2017). The value of the determinant for the correlation matrix was 0.00057, indicating no multicollinearity existed in the data.

The Hypothesized Model

The correlated five-component 22-Item hypothesized model proposed by Segal et al. (2017; see Appendix D) was entered into Stata 16.1 for analysis. The model was also entered into Intellectus Statistics software, and the result was compared to the Stata 16.1 result. The results were identical. The hypothesized model was described in Chapter 3 and presented in Appendix D.

Results of Model Estimation

The model with standardized estimates is presented in Appendix F. Unstandardized factor loadings, standard errors, standardized loading, and significance levels for each parameter in the CFA model ($N = 300$) are presented in Appendices G, H, and I. Table 10 presents the correlations between the latent variables.

Table 10

Correlation Table for the Latent Variables in the 22-Item EAI

	AR	SOA	PT	AM	ER
AR	1.00	—	—	—	—
SOA	.31	1.00	—	—	—
PT	.56	.76	1.00	—	—
AM	.65	.73	.91	1.00	—
ER	.28	.57	.35	.20	1.00

Note. AR = affective response; SOA = self-other awareness; PT = perspective taking; AM = affective mentalizing; ER = emotion regulation

The Goodness of Fit Test

A chi-square goodness of fit test was conducted to determine if the CFA model fits the data adequately. The chi-square goodness of fit test result was significant, $\chi^2(199) = 605.41$, $p < .001$, suggesting that the model did not adequately fit the data.

Fit Indices

Observed values and cut-off values of the fit indices are summarized in Table 11. The NC indicated an unacceptable model fit (Kline, 2015). RMSEA index indicated a mediocre model fit (Hooper et al., 2008). The CFI and Tucker-Lewis index (TLI) indicated a poor model fit (Hooper et al., 2008). The SRMR implied that the model fits the data adequately (Hooper et al., 2008).

Segal et al. (2017) presented the 22-Item EAI as a correlated five-component model; however, the hypothesized model was not supported in the sample of participants identified within the current study. Accordingly, the alternative hypothesis was accepted.

Table 11

Observed Model Fit Indices of the Correlated, Five-component Model With Cut-Off Values

Fit Statistic	Cut-off Value	Observed Value
χ^2(df)	No cut-off value; a non-significant value indicates good fit	605.41(199)*
NC; χ^2/df	< 2.00 for good fit < 3.00 for acceptable fit	3.04
RMSEA [90% CI]	< .06 for good fit ≤ .08 for acceptable fit	.08 [.08, .09]
CFI	≥ .95 for good fit ≥ .90 for acceptable fit	.80
TLI	≥ .95 for good fit ≥ .90 for acceptable fit	.77
SRMR	≤ 0.08 for good fit	0.08

Note. χ^2 = chi-square; df = degrees of freedom; NC = normed chi-square statistic; RMSEA = root-mean-square error of approximation; CI = confidence interval; CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean squared residual. The cut-off values of the NC is according to Kline (2015). The cut-off values of RMSEA, CFI, TLI, and SRMR are based on Hu and Bentler's (1999) recommended values.

* $p < .001$

Model Modification Indices and Squared Multiple Correlations

Post-hoc model modifications were not performed. Nevertheless, modification indices (see Appendix J) were examined to identify areas of strain that could account for the observed

inadequate fit of the model. For example, the modification indices indicated that allowing each of the perspective taking items to load freely on the affective mentalizing component would result in a decrease of the chi-square goodness of fit statistic. Additionally, the individual relationship between each indicator variable and latent variable was assessed by the observed variable's R^2 value. The R^2 value identifies how much of the indicator variable's variance explains the factor. An R^2 value $\leq .20$ suggests that the observed variable does not adequately describe the factor and should be considered for removal from the model (Hooper et al., 2008). The following observed variables (i.e., items on the EAI) had R^2 values $\leq .20$: 11, 19, and 20. The R^2 values and the error variances for each observed variable are summarized in Appendix K.

Summary

The results of descriptive analyses, assumptions of normality, and a CFA were reported in Chapter 4. In light of inadequate or poor fit noted in the fit indices within the modeling process, the five-component structure of the EAI as hypothesized was not confirmed in the current study's sample and the alternative hypothesis was accepted. A discussion of the findings is presented in Chapter 5.

V. DISCUSSION

The purpose of the study was to determine whether the factor structure of the 22-Item EAI in a diverse community sample of adults was a correlated five-component model as proposed by the instrument's developers. A CFA (Jöreskog, 1969) was used to confirm the hypothesized theoretical relationships of five latent (i.e., unobserved) variables and 22 observed variables (i.e., the items on the EAI). The a priori theoretical model of the 22-Item EAI was based on the SCN conceptualization of empathy.

The SCN conceptual model presents empathy as a multidimensional construct involving neurological processes that enable observers to share a target's emotional state and understand the emotional experiences according to the target's perspective without becoming overwhelmed by the target's emotional state (Decety & Jackson, 2004, 2006; Decety & Moriguchi, 2007). Evidence from neurological studies using fMRI and other brain-imaging techniques indicated that the functional components of empathy involve both discrete and overlapping neural pathways (Decety & Jackson, 2004, 2006; Decety & Moriguchi, 2007; Lamm et al., 2019; Walter, 2012). The objectively observed neural pathways instantiate four major functional components of empathy: affective sharing, self-awareness, mental flexibility, and regulatory processes (Decety & Moriguchi, 2007; Walter, 2012). Segal et al. (2017) constructed the EAI with 22 items to capture the four functional components according to five theorized components: affective response, self-other awareness, perspective taking, affective mentalizing, and emotion

regulation. Affective response, measured with five items, reflects affective sharing. Measured within the items was the extent to which respondents perceive they experience an automatic perception and sharing of a target's emotions. The functional component of self-awareness was operationalized in the EAI with four items to measure self-other awareness, which addresses the respondent's ability to differentiate personal emotional states from a target's emotional state. The ability of an observer to adopt the subjective perspective of a target, known as mental flexibility, was measured in the 22-Item EAI with two components, perspective taking (five items) and affective mentalizing (four items). Lastly, the regulatory processes of empathy were measured with a component called emotion regulation (four items). A more detailed discussion of the SCN conceptualization of empathy and the EAI is in Chapters 1 and 2. The 22-Item EAI is located in Appendix A.

Statement of Problem

The validation studies conducted during the construction of the EAI have limitations. First, the EAI studies have used samples comprised primarily of university students and, more specifically, social work students (Lietz et al., 2011; Segal et al., 2012). Second, since the samples were comprised of university students, the mean age of the samples used in the factor analysis studies during the development of the EAI (Gerdes et al., 2011; Lietz et al., 2011) was equal to or less than 23 years. An examination of the use of the 22-Item EAI in a diverse sample of adults from the general population was necessary to ascertain the instrument's generalizability in diverse populations across multiple age groups, student status, and occupational interest. Finally, the factor structure of the 22-Item EAI does not appear to have been examined in any sample after the fifth theorized component, affective mentalizing, was added and after items were revised after a known-groups validity study (Gerdes et al., 2012).

When researchers included the 22-Item EAI in a CFA study of the ISEI—an instrument that combined the 22-Item EAI and the Social Empathy Index (Segal et al., 2012) as one instrument—three items theorized to measure the affective mentalizing component loaded on the same factors as items theorized to measure the perspective taking or self-other awareness. In a CFA study of a Swedish-language version of the 22-Item EAI in a sample of university-level police recruits ($N = 330$), Inzunza (2015) observed inadequate fit of the data for the five-component model of the instrument and a strong correlation between the perspective taking and affective mentalizing components ($r = .83$). A subsequent EFA and CFA in independent samples revealed a four-factor model of the EAI comprising 18 items had an acceptable fit to the data. Results of the EFA suggested that the four items theorized to measure affective mentalizing loaded on a single factor along with two items theorized to measure perspective taking. An acceptable fit to the data of the four-factor model of the Swedish-EAI (i.e., perspective taking—six items; affective response—five items; emotion regulation—three items; and self-other awareness—three items) was replicated in a study reported by Inzunza et al. (2019) in a sample of Swedish National Police recruits ($N = 168$). Apparently, the affective mentalizing items that were added after the known-groups validity study (Gerdes et al., 2012) may not measure a unique component of affective mentalizing.

Considering the limitations of the validity studies and the possible model misspecifications observed in the studies conducted by Segal et al. (2013) and Inzunza (2015) and the possible lack of discriminant validity between affective mentalizing and perspective taking, a CFA to assess the model fit of the 22-Item, five-component version of the EAI was considered to be worthwhile and necessary to provide evidence to instill confidence in the findings from the instrument's use. The study's purpose to examine the factor structure of the 22-

Item EAI in a sample of community adults aligns with Gerdes et al.'s (2012) acknowledgement that the EAI, as a new instrument, must undergo further testing to accumulate "evidence over time to instill confidence in findings" (p. 108) when the instrument is used in studies in which empathy is a variable.

Review of Methodology

The study was non-experimental, quantitative, and cross-sectional. The survey method using the 22-Item EAI was used to collect data to address a single research question: Is the structure of the 22-Item EAI a correlated five-component model as proposed by the instrument's developers? The alternative hypothesis stated that the factor structure of the 22-Item EAI is not a five-factor model.

Before data were collected, the Institutional Review Board of Southeastern University granted permission to proceed with the study. A community sample of adult volunteers (at least 18 years of age) was recruited via email and social media using a snowball sampling technique. Responses to the EAI, titled "Human Relations Survey," and nine demographic items were collected anonymously during August and September of 2020 through a web-based survey hosted on SurveyMonkey. Respondents used a 6-point Likert scale ranging from 1 (*never*) to 6 (*always*) to indicate their feelings or beliefs about the 22 items of the EAI. Detailed descriptions of the validity and reliability of the EAI was presented in Chapter 3.

Preliminary analyses were conducted to determine the level of missing data and the presence of outliers. Cases with missing data and outliers were removed from the sample before further analyses considering that the sample size was sufficient to conduct the CFA, which was the study's chief aim. A randomly generated subsample of 300 cases was accessed for study purposes from the final valid sample for the CFA.

Stata version 16.1 was used to analyze the demographic data of the entire sample and a randomly generated subsample using measures of frequency, central tendency, and dispersion. The percentages of participants' responses to the demographic items were calculated based on gender, age group, race, ethnicity, student status, the highest level of education, occupational category, and religious identification. Table 6 summarizes the descriptive demographic data.

The method of estimation in a CFA is dependent upon the results of analyses of the assumptions of normality. The EAI responses were considered continuous data (Tabachnick & Fidell, 2019). The internal consistency of the 22 items of the EAI was assessed using Cronbach's alpha. The skewness and kurtosis values of each EAI item and the five components were evaluated to determine univariate and multivariate normality using SPSS version 27. The visual interpretation of P-P plots, Q-Q plots, histograms, and box-and-whisker plots was also used to evaluate outliers and the normality of data. The determinant of the correlation matrix was calculated to detect multicollinearity. The assumptions of normality were satisfied; therefore, maximum likelihood was used to estimate the hypothesized model.

Stata version 16.1 was used to define and estimate the hypothesized model (see Appendix D for the hypothesized model and Appendix E for the estimated model). After estimation, the model's fit was examined according to the chi-square statistic and pre-determined fit indices with their respective cut-off values. The fit indices and cut-off values were summarized in Table 5.

The internal reliability of the EAI models was assessed using Cronbach's alpha for each component and McDonald's omega for the composite EAI. Modification indices, R^2 values of the observed variables, and the interpretability, size, and statistical significance of the model's parameter estimates were examined to evaluate the CFA and to determine areas of possible strain on the model. Considering the aim of the study was confirmatory in nature, no post-hoc model

modifications were made.

Summary of Results

The snowball sampling technique generated 929 responses to the online survey hosted on SurveyMonkey. Cases missing EAI data (21 cases) and cases with outliers (five cases) were removed from the study's sample. The total valid sample was 903. A random sample of 300 was accessed from the total valid sample, which was determined to be a sufficient sample size to conduct a CFA according to Bentler and Chou's (1987) *N*:*q* ratio rule-of-thumb.

Descriptive statistics for the demographic items according to total valid sample and the random subsample were summarized in Table 6. One aim of the snowball sampling technique was to recruit a diverse sample of adults from the community that represented a broader perspective than an undergraduate and social work perspective. The total sample and subsample ($N = 903$; $n = 300$) were mostly female (78%; 79%), White (91%; 90%), non-Hispanic (87%; 89%), non-students (77%; 78%), and Christian (83%; 82%). By comparison, the samples in the EAI pilot study and the EFA and CFA validation study during the construction of the EAI were 83% and 74% females, 56% and 59% White, and 0% and 11% non-students (Gerdes et al., 2011; and Lietz et al., 2011, respectively). Ethnicity and religious identity were not reported for the samples in the validation studies of the EAI. The study's respondents also were well-educated, with over 81% (total sample) and 82% (subsample) of respondents reporting at least an associate degree as the highest level of education. Over 27 occupational categories were represented in the study's sample set, with 52% reporting education, health care, and social services as the occupational category. By comparison, Lietz et al.'s (2011) sample, which included 85 community members, represented 12 occupational categories, with 55% of respondents reporting education, health, and social services as the occupational category. The mean age of the study's

sample was 44.98 years (*SD* = 14.37 years), with ages ranging from 19 to 84 years and the mean age of the study's subsample was 45.39 years (*SD* = 14.37), with ages ranging from 19 to 78. The mean age in Lietz et al.'s study was 21.37 years (*SD* and age range were not reported). The age range in Gerdes et al.'s (2011) study ranged from 18 to 60 years. The study's sample appears to be more diverse than the samples used during the construction and validation of the EAI with the exception of race and gender. Gerdes et al.'s sample and Lietz et al.'s sample were more diverse according to race, but all three studies were over-represented by females.

The mean composite scores ranged from 3.18 to 5.82. Mean component scores ranged from 1.75 to 6.00. Higher mean scores indicated greater levels of empathy. The internal consistency of the component means in both the total sample ($N = 903$) and the random subsample ($n = 300$) had Cronbach's alphas ranging from .60 to .79. The internal consistency of the composite mean was excellent in the total sample ($\omega = .84$) and the subsample ($\omega = .85$).

The study's data set ($n = 300$) reflected no missing values nor influential outliers. The skewness and kurtosis values indicated no violations of univariate and multivariate normality, with no variables outside the limits of +/−2 for skewness and +/− 7 for kurtosis (George & Mallery, 2019). The assumption of multicollinearity was satisfied as no variables exhibited R^2 values greater than .90 (Kline, 2015). As a result, the maximum likelihood estimation technique was used to estimate the model. Considering that the assumptions of normality were satisfied, the goodness of fit statistics are presumed to be unbiased.

The chi-square goodness of fit test result was statistically significant, $\chi^2(199) = 605.41$, $p < .001$, suggesting that the model did not adequately fit the data. Additionally, an examination of other fit indices associated with CFA corroborated the lack of fit noted in the goodness of fit analysis. The NC was greater than 3.00, which is indicative of an unacceptable model fit (Kline,

2015). The RMSEA index was between .08 and .10, which is indicative of a mediocre model fit (Hooper et al., 2008). The CFI was less than .90, suggesting that the model is indicative of a poor model fit (Hooper et al., 2008). The TLI was less than .95, which is indicative of a poor model fit (Hooper et al., 2008). The SRMR was between .05 and .08, which implies that the model fits the data adequately (Hooper et al., 2008). A more detailed description and illustration of the observed fit values is contained in Table 11.

Discussion of the Research Question

The following research question and hypothesis was addressed in the study:

Is the structure of the 22-Item EAI a correlated five-component model as proposed by the instrument's developers?

H_a: The factor structure of the 22-Item EAI is not a five-component model.

Based on an interpretation of the chi-square goodness of fit statistic, NC, RMSEA, CFI, TLI, and SRMR, the alternative hypothesis was accepted. The hypothesized five-component model of the 22-Item EAI was not supported in the study's sample of adults.

An examination of the modification indices revealed areas of possible model misspecification (see Appendix I). A modification index is an approximate value of decrease in the chi-square statistic if a fixed parameter was freely estimated (Brown & Moore, 2012). For example, the modification indices indicated that allowing any item previously fixed to estimate a parameter connected to the perspective taking latent variable to load freely on the affective mentalizing latent variable would result in a decrease of the chi-square goodness of fit statistic.

Another useful statistic to find areas of strain in an estimated model are the R^2 values. The R^2 values are computed as the square of the standardized loadings in the estimated model and identify the amount of the indicator variables' variance that explains a factor. An

examination of the R^2 values revealed that three items did not adequately describe the latent factor as expected and, therefore, should be removed from the data considering their observed R^2 values were less than 0.20: item 11 from the affective response component, $R^2 = .19$; item 19 from the perspective taking component, $R^2 = .19$; and item 20 from the self-other awareness component, $R^2 = .18$. The values indicate that less than 20% of the observed variable's variance was explained by its associated latent variable. The table in Appendix J summarizes the R^2 values of the estimated model.

The third source of information regarding possible areas of strain in the model are the strength of the correlation coefficients between the latent variables. The standardized correlation coefficient for the affective mentalizing latent variable and the perspective taking variable in the estimated model was .91 indicating a very strong intercorrelation between the two latent variables. The high level of correlation implies the two variables may measure the same construct and, therefore, may indicate poor discriminant validity. A more parsimonious solution with better fit to the data may be obtained with fewer latent variables by allowing the items measuring affective mentalizing and perspective taking to load on a single latent variable, which is also supported according to the modification indices as previously mentioned.

Any post-hoc modifications of a model to improve model fit should make theoretical sense (Schreiber et al., 2006). Making modifications based solely on suggestions of the modification indices replaces the aim of confirming an a priori model with an exploratory aim. Therefore, an EFA is the appropriate strategy to further analyze the data to explore the 22-Item EAI factor structure to determine whether an alternative model provides a better fit.

According to Brown and Moore (2012), interpreting the strength and statistical significance of the parameter estimates should only be pursued in the context of a good-fitting

solution. Considering the model in the study reflected inadequate fit to the study's data, the parameter estimates may be incorrect or biased. Accordingly, and in light of the model's lack of fit, further interpretation of the parameter estimates of the EAI was not pursued in the study.

Study Limitations

The sample in the study was a sample of convenience collected using a snowball method. In research, a sample of convenience cannot be generalized to a population; therefore, the findings of the study are limited to the sample of adults represented, not to an entire population of adults. The study's sample over-represented the empathy levels in females (77.82%) and White, non-Hispanic respondents (90.92% and 87.49%, respectively). Additionally, the Christian viewpoint was overrepresented (82.56%). Using a purposive sampling technique in future studies could provide a more representative sample of the population, particularly as it relates to gender, race, ethnicity, and religious views of study participants. Including regional identification or cultural identification may also provide useful comparisons of empathy.

Social desirability is a concern for any self-report instrument and may have influenced the respondents who selected responses considered to be more socially acceptable answers. However, the complete anonymity of the survey may have mediated any social desirability bias. Also, the self-selection process may have introduced bias in the sample; the individuals who responded may differ from those who did not respond. Individuals with more empathy may have been more inclined to help the researcher and, therefore, replied to the request to participate. Conversely, individuals with lower empathy levels may have ignored the invitation to participate because they did not care about assisting the researcher in conducting the study. As such, the results of the study's sample may differ from the results that might be found in populations with perceived lower levels of empathy (e.g., prisoners, aggressive individuals, narcissists, or

individuals who felt compelled or coerced to participate) or in samples who were recruited by inducement, such as a monetary incentive (e.g., gift card or compensation for participation) or an offer of extra credit in a course in a university context.

Another limitation that cannot be overlooked is that the construct of empathy is not a stable condition; life circumstances at the time of completing the instrument may have been a moderating and unknown variable that influenced the respondents' subjective experience of empathy (Cimino et al., 2020; Segal et al., 2013). The respondent's state of mind and life experiences when taking the survey may have influenced the selection of Likert scale responses to the individual items. Also, the responses may be different if the respondent is asked to respond under different conditions, such as when thinking about a family member or someone of a different race or ethnicity. Additionally, individuals may be poor appraisers of their own ability or propensity to engage in the processes related to empathy (Murphy & Lilienfeld, 2019). Respondents may judge their ability to infer the feelings and viewpoints of others and to share a target's emotions more highly than merited.

A further limitation of the study is that the EAI is a measure of an individual's beliefs and attitudes but not the person's actual behavior. Therefore, the empathy scores on the EAI may not necessarily reflect the target's authentic empathic behavior (Segal et al., 2013). Moreover, the EAI results do not imply causality; higher empathy scores do not cause more empathic behavior.

Finally, the study was limited to examining the factor structure of the 22-Item EAI. Validating the EAI was not a focus of the study. The results of the study should not be used as evidence of the validity or lack of validity of the EAI. The results indicate only that the study's data in the sample did not demonstrate good fit to the data, which suggests that additional psychometric research is necessary to improve the model. Modification indices, observed

correlations, and standardized residuals may identify areas of model misspecification to provide a starting point for revisions and instrument refinement.

Implications for Future Practice and Research

The role of empathy in human relationships cannot be understated. Considering the recent social events involving racism, prejudice, and violence against marginalized populations, developing and evaluating trainings and interventions to address empathy deficits are vitally important endeavors. Lietz et al. (2011) and Gerdes et al. (2012) stated that their aim in developing the EAI was to provide a self-report instrument based on the SCN conceptualization of empathy that could serve as a measure of empathy and its essential components. Indeed, an understanding of the three functional mechanisms involved in the experience of empathy (Decety & Jackson, 2004, 2006; Decety & Moriguchi, 2007) and the four neurological processes involved in the processing of emotional information (Decety & Moriguchi, 2007) could enhance educators' abilities to develop targeted interventions to improve the necessary skills to enable individuals to experience the full range of empathy that foster harmonious social interactions, effective leadership, and healthy relationships.

For example, a person may have a high overall empathy score but a low score in one of the components. By isolating the skill in which the individual is deficient, a specific training protocol can be conducted to help raise the overall empathy score by increasing the individual's component skill. By way of an illustration, a person who struggles with burnout because of compassion fatigue may identify too closely with the target's emotions. The individual's empathy score may be high, but the person's emotion regulation score or self-other awareness score may be low. To help the person experience empathy rather than personal distress, the individual could be provided with training specifically targeted to increase the ability to regulate emotions or to

maintain healthy boundaries between the emotions of the target from his or her own emotions. Additionally, instructing people about intentionally taking the perspective of others and to imagine the emotions of a target might influence an observer to make the conscious choice to empathize with targets who are dissimilar from the self. However, before the EAI is used to measure the levels of individual components of empathy in individuals, to predict the relationship of empathy to variables of interest, or to develop targeted interventions to improve the individual components of empathy, the factor structure of the 22-Item EAI must first be determined.

The findings of the study would appear to indicate more research is needed to develop the EAI as a reliable and valid measure of empathy and its components. The CFA used in the study indicated an unacceptable model fit for the five-component model of the EAI; therefore, the hypothesized model appears to be mis-specified, and data in the study do not support the underlying structure proposed by Segal et al. (2017). Consequently, researchers should be cautious when interpreting studies that have used component scores of the 22-Item EAI in their analyses as the values of the component scores used in the analyses may be incorrect. For example, Raynor and Hicks (2019) used the component scores from the 22-Item EAI to examine the relationship of the levels of each component of empathy with burnout, secondary traumatic stress, and compassion satisfaction in Australian registered migration agents (N =188). However, Raynor and Hicks's results and subsequent interpretations of the hierarchical multiple regressions they conducted may not be accurate and should be used with caution.

Likewise, Greeno et al.'s (2018) conclusions regarding the correlations of each component to the TEQ (Spreng et al., 2009) may be inaccurate. Greeno et al. used the five-component model of the 22-Item EAI to examine the correlation of the total EAI score and each

component score to the TEQ. Greeno et al. reported that affective mentalizing and affective response were moderately correlated with the TEQ and concluded that each component, therefore, reflected affective empathy. However, other researchers consider affective mentalizing as a measure of the cognitive dimension of empathy (Gerdes et al, 2012; Inzunza, 2015; Segal et al., 2013). If the affective mentalizing and the perspective taking component measure the same underlying component of empathy (i.e., cognitive empathy), the results of Greeno et al.'s study are inaccurate and the correlations of the components of the EAI and the TEQ may not reflect accurate relationships. Hence, re-evaluating the factor structure of the 22-Item EAI is critical to advance an understanding of empathy and its components.

The modification indices are valuable tools to identify areas of model misspecification. However, best practice in CFA precludes deleting underperforming items, allowing indicators to load on multiple factors or on factors other than the theorized factor, or adding or subtracting parameters from the hypothesized model. Making modifications to the model based solely on the modification indices may be sample specific rather than theoretically defensible. Therefore, the first recommendation for future research of the 22-Item EAI is an EFA to determine the underlying latent factor structure of the instrument. Afterwards, a CFA of the emerging factor structure from the EFA should be conducted in an independent sample.

Different models are theoretically possible and should be explored through EFAs and then confirmed with CFAs according to the EFA results. First, a three-component model based on the three functional mechanisms suggested by SCN (i.e., affective sharing, self-other awareness, and mental flexibility) should be explored. In the three-component model, the current items associated with affective response would be indicators of affective sharing; the current items associated with self-other awareness would continue to be indicators of self-other

awareness, and the current items associated with perspective taking, affective mentalizing, and emotion regulation would be indicators of mental flexibility. Alternatively, the three components may account for affective empathy (i.e., affective response), cognitive empathy (perspective taking and affective mentalizing), and moderating aspects (i.e., self-other awareness and emotion regulation).

A second model that should be explored through EFA is a four-component model. Inzunza (2015) found that a four-component model had an acceptable fit to the data in his study. The four-component model was supported in a subsequent CFA in a separate study in an independent sample (Inzunza et al., 2019). An EFA may reveal that the affective mentalizing items and perspective taking items in the English version of the 22-Item EAI load on a single factor as they did in the Swedish samples (Inzunza, 2015). The four-component model makes sense according to the SCN conceptualization of empathy in which Decety and Moriguchi (2007) identified four neurological processes involved in the experience of empathy: affective sharing (i.e., affective response), self-other awareness, mental flexibility (i.e., perspective taking and affective mentalizing), and emotion regulation.

A third model to examine using CFA after a multidimensional model of the EAI is revealed through an EFA is a bifactor model following Cimino et al.'s (2020) method. Cimino et al. examined four measurement models (i.e., one general factor model, a four correlated factors model, a second-order factor model, and a bifactor model) using a version of the EAI with 16 items and a sample of undergraduate and graduate students (N = 475; 72% female; M_{age} = 22.8, SD = 6.9; 54.4% White). The bifactor model, which consisted of four correlated components as well as a general empathy component comprising all 16 items that was uncorrelated to the four correlated components, had the best fit, albeit a minimally acceptable fit according to the

standards of fit, of the four examined models: $\chi^2(82) = 232.08$, $p < .001$; NC = 2.83; CFI = .89; TLI = .90; RMSEA = 0.06 [0.05, 0.07]; SRMR = 0.05. The benefit of the bifactor model is that the general empathy component, comprising all items, may account for an overall experience of empathy that is separate from the individual components of empathy while still maintaining the SCN multidimensional model of empathy that accounts for affective sharing, self-other differentiation, perspective taking and affective mentalizing (i.e., mental flexibility or cognitive empathy) and emotion regulation.

The poor model fit in the study's sample may be due, in part, to the difficulty of differentiating affective mentalizing from perspective taking. Gerdes et al. (2012) stated that they added items to measure affective mentalizing to expand the perspective taking component. However, the affective mentalizing items may not measure a unique fifth component. Instead, the affective mentalizing items and perspective taking items may capture different facets of perspective taking (i.e., cognitive perspective taking and affective perspective taking) as defined by Healy and Grossman (2018). Healy and Grossman subdivided perspective taking into cognitive and affective elements and presented neurological evidence that suggests that the two forms of perspective taking engage distinct brain regions as well as shared regions of the brain. Although neurological evidence provides support for the differentiation of perspective taking processing from affective mentalizing processing, composing items for a self-report instrument to capture the subtle nuances differentiating cognitive perspective taking from affective perspective taking (i.e., affective mentalizing) requires more research and item refinement. As the items are currently represented on the index, an EFA of the 22-Item EAI may indicate a single factor underlying the items used to measure perspective taking and affective mentalizing. If so, mental flexibility is an appropriate term for the component as the term aligns with Decety

and Moriguchi's (2007) use of the term to describe the imagining the perspective and emotions of others.

Considering that self-report instruments are limited due to social desirability bias and the difficulty of using language to differentiate between the neural processes involving closely related neurological processes, researchers should consider using the EAI in experimental and quasi-experimental studies. Studies of empathy using the EAI in conjunction with neuroimaging and behavioral tasks protocols, such as the Yoni task (Dvash & Shamay-Tsoory, 2014) and the Reading the Mind in the Eyes Test (Baron-Cohen et al., 2001) would be helpful in identifying and clarifying the components of empathy. The Yoni task requires participants to select from four possible answers what Yoni, a cartoon outline of a face with expressive facial features, is thinking. Participants base their responses on a prompt and a visual cue such as the direction of Yoni's eye gaze. The Reading the Mind in the Eyes Test is an objective measure of adults' ability to mentalize and involves identifying what a target in a photograph is thinking or feeling based on the facial expressions from the eye regions. The Yoni task and the Reading the Mind in the Eyes Test are related to perspective taking and mentalizing; therefore, studies involving these protocols along with the EAI could be used to revise the items measuring perspective taking and affective mentalizing.

The generalizability of the EAI's use in diverse populations remains unknown. The study's sample and the samples in previous studies of the EAI overrepresented White females. Additionally, before the current study, nonstudents were rarely represented in samples. Therefore, future studies should be conducted using samples more representative of the general population after the factor structure of the EAI has been determined. Recruiting participants representative of all races, ethnicity, genders, and ages is an important aim for future studies to

provide a clearer understanding of empathy in general and to determine whether the EAI has the same factor structure and measures the same constructs across diverse groups in particular. Additionally, religious beliefs, spirituality, cultural norms, and regional characteristics may moderate an individual's level of empathy. Therefore, studies should be conducted to compare empathy levels using the 22-Item EAI to examine the influence of such variables to the level of empathy and each component of empathy in individuals or in collective groups of individuals. For example, valuable information about empathy and its components may come from a study in which a researcher compares the levels of empathy in individuals from a culture with an individualistic worldview and in individuals from cultures with a collectivist worldview.

Differential item functioning analysis can be conducted to determine whether the items of the EAI have uniform discriminant power between diverse groups. Additionally, separate EFAs can be conducted to explore models of the EAI according to gender, race, age groups, socio-economic status, individualistic worldviews, collectivist worldviews, and religious beliefs to name just a few possibilities. The results of the EFAs would provide valuable information regarding the generalizability of the EAI and the consistency of its underlying latent factor structure.

Conclusion

The 22-Item EAI is a unique measure of empathy; it appears to be the sole multidimensional model of empathy based on an SCN conceptualization of empathy. Although affective response, self-other awareness, perspective taking, affective mentalizing, and emotion regulation may be the skills and processes involved in empathy, the five-component model of the 22-Item EAI was not supported in the study's sample. Of note, the affective mentalizing component may not be working as Segal et al. (2017) had anticipated. Therefore, before

researchers interpret results of studies using the 22-Item EAI in predictive, correlation, intervention, or experimental studies, a model with good fit must first be determined. Modifications of the 22-Item EAI should be based on the results of an EFA rather than CFA modification indices. Once the underlying factor structure of the index has been determined, researchers can then assess the generalizability of the index across diverse samples and interpret the relationship of empathy and its components to variables of interests such as pro-social behavior, altruism, sympathy, compassion, compassion fatigue, burnout, racism, bullying, manipulation, narcissism, and domestic violence. A better understanding of empathy and its components would enable educators to design effective professional development and training materials to facilitate the targeted improvement of each component of empathy and, thus, increase an individual's overall level of empathy.

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Appendix A

The Empathy Assessment Index and Nine Demographic Items

Segal et al. (2017) gave clear approval to use their recently developed instrument (i.e., the EAI) and provided complete instruments with instructions in *Assessing Empathy*. Segal and colleagues (2017) wrote, "We look forward to seeing the results of studies using these instruments, as replication and wide application are the best ways to further our collective knowledge" (Segal et al., 2017, p. 124). In view that Segal et al. gave open approval to use their instruments, obtaining specific written permission to use the Empathy Assessment Index from the authors of the instrument was not pursued.

The EAI comprises 22 items (Segal et al., 2017, pp. 137-138). The items measure interpersonal empathy, which has been operationalized with five factors: affective response (AR; five items), emotion regulation (ER; four items, with two reverse scored), affective mentalizing (AM; four items), perspective taking (PT; five items), and self-other awareness (SOA; four items). In this appendix, the factor references are provided in brackets to identify the operationalization of the separate factors, but these identifiers will be removed before the survey is administered. Items 5 and 10 were reverse scored prior to computing the factor scores and analyzing the data.

The nine demographic items are age, gender, race, ethnicity, student or nonstudent status, employment status, major of study or professional background, highest level of education, and religious affiliation.

Human Relations Survey

Please respond to the following questions by selecting the choice that most closely reflects your feelings or beliefs. Use the following scale:

1 = never; 2 = rarely; 3 = sometimes; 4 = frequently; 5 = almost always; and, 6 = always.

1. When I see someone receive a gift that makes them happy, I feel happy myself. [AR]
2. Emotional stability describes me well. [ER]
3. I am good at understanding other people's emotions. [AM]
4. I can consider my point of view and another person's point of view at the same time. [PT]
5. When I get angry, I need a lot of time to get over it. [ER] Reverse scored
6. I can imagine what the character is feeling in a good movie. [PT]
7. When I see someone being publicly embarrassed, I cringe a little. [AR]
8. I can tell the difference between someone else's feelings and my own. [SOA]
9. When I see a person experiencing a strong emotion, I can accurately assess what that person is feeling. [AM]
10. Friends view me as a moody person. [ER] Reverse scored
11. When I see someone accidentally hit his or her thumb with a hammer, I feel a flash of pain myself. [AR]
12. When I see a person experiencing a strong emotion, I can describe what the person is feeling to someone else. [AM]
13. I can imagine what it's like to be in someone else's shoes. [PT]
14. I can tell the difference between my friend's feelings and my own. [SOA]
15. I consider other people's points of view in discussions. [PT]

16. When I am with someone who gets sad news, I feel sad for a moment too. [AR]

17. When I am upset or unhappy, I get over it quickly. [ER]

18. I can explain to others how I am feeling. [SOA]

19. I can agree to disagree with other people. [PT]

20. I am aware of what other people think of me. [SOA]

21. Hearing laughter makes me smile. [AR]

22. I am aware of other people's emotions. [AM]

Demographic Questions

23. Please specify your age in years. _____

24. With which gender do you identify?
- Male
- Female
- Other_____ (please specify)

25. Please specify your race.
- American Indian or Alaska Native
- Asian (includes Pakistan)
- Black or African American
- Native Hawaiian or Other Pacific Islander
- White
- Two or more races
- Other_____ (please specify)

26. Please specify your ethnicity.
- Hispanic or Latino/a
- Not Hispanic or Latino/a
- Other _____ (please specify)

27. If you are not a current university or college student (full-time or part-time), please select N/A, skip question 28, and continue the survey with question 29.
    - ○ N/A (not applicable)

    If you are a current university or college student (full-time or part-time), please identify your current level in school; select only one response.

    Undergraduate; check only one

    - o First year
    - o Sophomore
    - o Junior
    - o Senior

    Graduate

    - o Masters
    - o Doctorate

28. If you are a student, please specify your major or primary academic area of study.
    _____

29. Please identify the highest level of education you have achieved; select only one answer.
- o Less than 9th grade
- o Some high school
- o GED
- o High school diploma
- o Some college
- o Associate degree
- o Bachelor's degree
- o Master's degree
- o Doctorate degree (includes JD)
- o Other_____ (please specify)

30. Please identify the general category of your current occupation with which you most identify. Select one.

- o Arts and Entertainment, TV
- o Business, Finance, Insurance, Real Estate, Banking
- o Childcare
- o Education
- o Engineering, STEM Occupations
- o First Responders (e.g., Firefighters, Police officers, EMS)
- o Health Care, Medicine, Dental, Nursing
- o Hospitality, Food Service, Hotel, Tourism, Restaurant
- o Legal, Lawyer, Mediation, Judge
- o Military (any branch)
- o Ministry (any denomination; includes para-church organizations, full-time missions)
- o Psychology, Social Services, Social Work
- o Public Administration, Human Resource Management, Office Administrators
- o Retail (including Grocery stores)
- o Student (full-time)
- o Other_____(Please specify)

31. Please specify your current religious affiliation (mark <u>one</u>).

- o Buddhist
- o Christian
- o Hindu
- o Islamic
- o Jewish
- o Other _____ (Please specify)
- o None

Appendix B

Sample Recruiting Scripts

Hello!

I'm so excited to announce that I have been given clearance to begin the data collection for my dissertation. To fulfill the requirements for my Doctor of Education degree, I am conducting research using an online survey. The purpose of the research study is to confirm the factor structure of the Human Relations Survey. To have a successful study, I need at least 700 adults to complete the Human Relations Survey and to provide general demographic information. No identifying information will be collected. You must be 18 years of age or older to participate.

Please help me by completing the survey and the demographic items. Before you begin the survey, you will be presented with an online consent form that explains the study in more detail. The survey is available at this link.

After you complete the survey, please use the following script to send the survey to everyone you know and to post the information on your social media.

Hello!

I just completed a Human Relations Survey for a doctoral student named Kelly. She is working on her dissertation for her Doctor of Education degree at Southeastern University. The survey takes less than ten minutes to complete, and no personal identification information is collected. The purpose of Kelly's research study is to confirm the factor structure of the Human Relations Survey. For a successful study, Kelly needs to gather responses from at least 700 adults.

Please take a few minutes to help her out by taking the survey at this link. After you complete the survey, please forward this email to everyone you know or post the information on your social media site.

Appendix C

Participant Informed Consent

Southeastern University

Title: A Confirmatory Factor Analysis of the Human Relations Survey

Investigator(s): James Anderson, PhD, Southeastern University (Doctoral Chair)

Thomas Gollery, EdD, Southeastern University (Methodologist)

Kelly Hoskins, MS, Southeastern University (Doctoral Candidate)

Purpose: The purpose of this research study is to confirm the factor structure model of the Human Relations Survey. You must be 18 years or older to participate.

What to Expect: This research study is administered online. Participation in this research will involve the completion of two questionnaires. The first questionnaire will ask you to rate your feelings or beliefs for 22 items on the Human Relations Survey. The six response choices will range from *never* to *always*. The second questionnaire will ask you to provide answers for nine general demographic questions: age, gender, race, ethnicity, student or nonstudent status, employment status, major of study or professional background, highest level of education, and religious affiliation. You may skip any questions that you do not wish to answer. You will be expected to complete each questionnaire once. It should take you no longer than 10 minutes to complete both questionnaires.

Risks: There are no risks associated with this project that are expected to be greater than those risks ordinarily encountered in daily life.

Benefits: There are no direct benefits to you. However, you may gain insight regarding how you relate to humans. You may also gain an appreciation and understanding of how research is conducted.

Compensation: You will receive no compensation for your participation.

Your Rights: Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time.

Confidentiality: No identifying information will be collected. The responses from this study will be confidential and anonymous. Research records will be stored on a password protected computer, and only researchers and individuals responsible for research oversight will have access to the records. Data will be destroyed five years after the study has been completed.

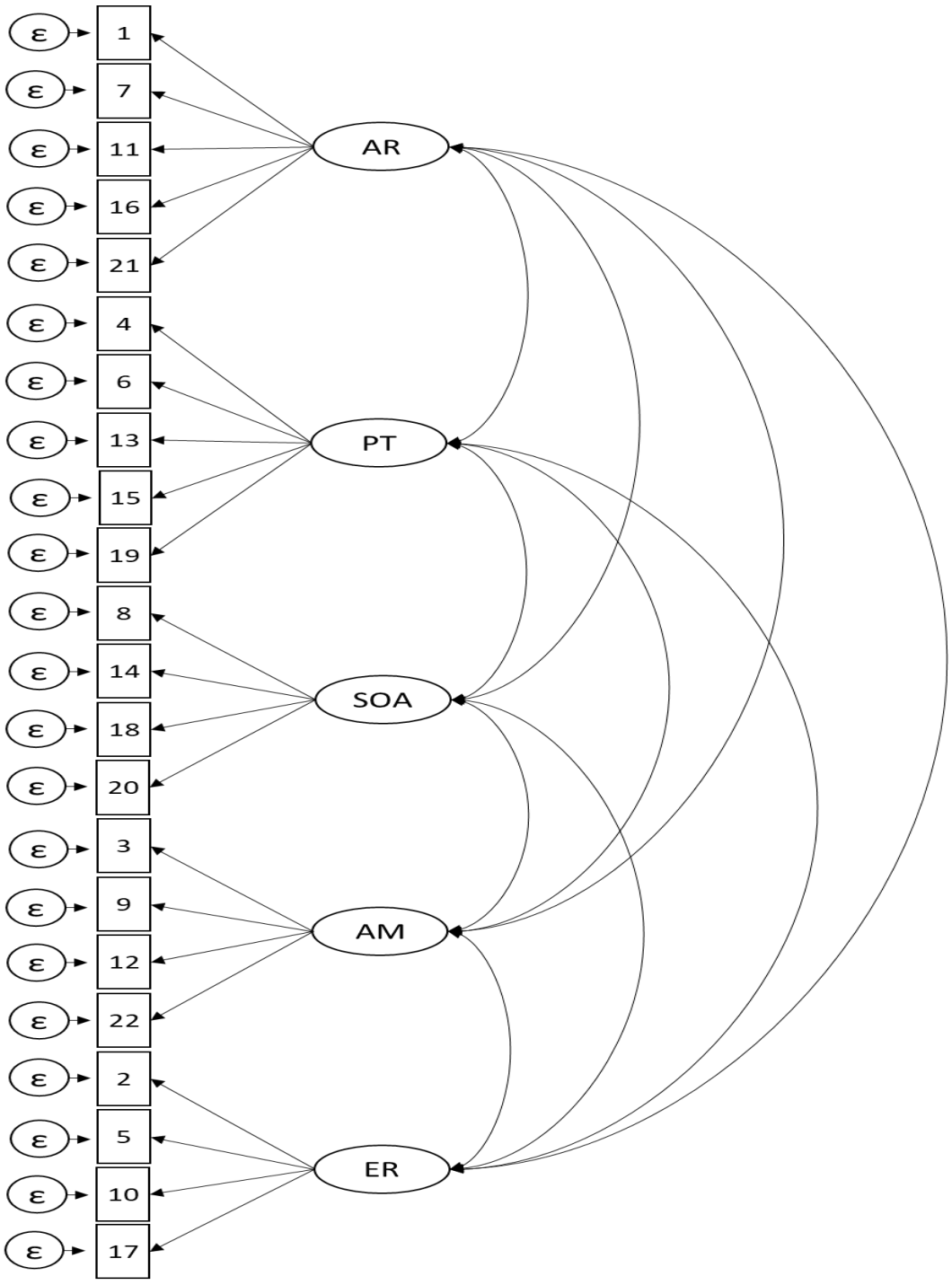
Contacts: You may contact any of the researchers at the following addresses should you desire to discuss your participation in the study and/or request information about the results of the study. Principal investigator: Dr. James Anderson, jaanderson2@seu.edu; co-investigators: Dr. Tom Gollery (methodologist), tjgollery@seu.edu, and Kelly Hoskins, doctoral candidate, klhoskins@seu.edu.

If you have questions about your rights as a research volunteer, you may contact the IRB Office: IRB@seu.edu

If you choose to participate: Please, click NEXT if you choose to participate. By clicking NEXT, you are indicating that you freely and voluntarily agree to participate in this study; you also acknowledge that you are at least 18 years of age.

Appendix D

Hypothesized Model Structure of the 22-Item EAI



Note. AR = affective response; PT = perspective taking; SOA = self-other awareness; AM = affective mentalizing; ER = emotion regulation

Appendix E

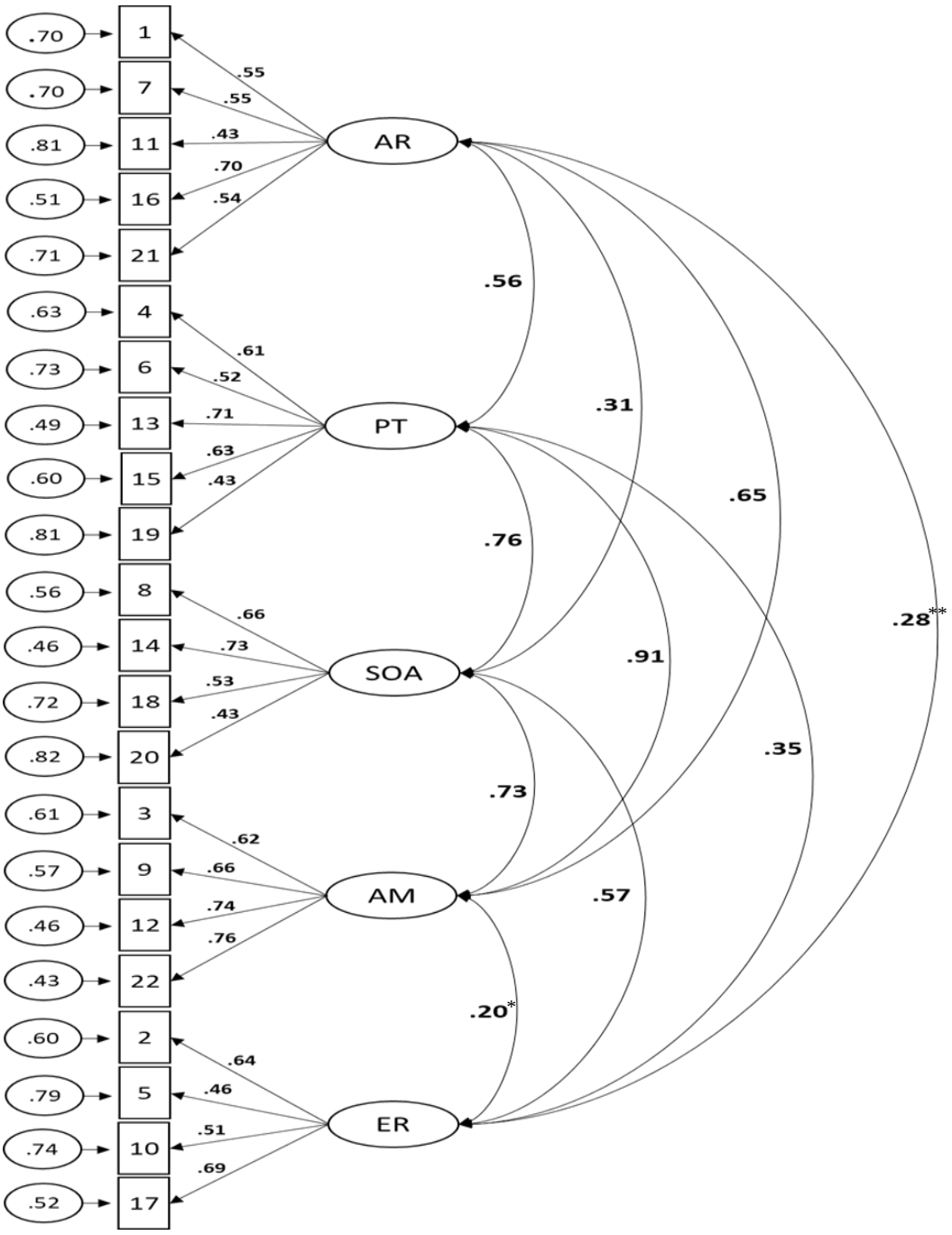
Internal Consistency Values of the Components of the Empathy Assessment Index in Four Studies

Component	Cronbach's Alpha				
	Study 1 Gerdes et al. (2011)	Study 2 Lietz et al. (2011)	Study 3 Segal et al. (2012)	Current Study $N = 903$	Current Study $n = 300$
Affective Response	.83	.84	.58	.63	.63
Self-Other Awareness		.70	.64	.60	.65
Perspective Taking	.81	.82	.74	.68	.71
Emotion Regulation	.81	.72	.68	.70	.67
Affective Mentalizing				.78	.79

Note. Blank cells indicate the component was not a component of the instrument used in the study.

Appendix F

Standardized Estimated Model of the 22-Item EAI



Note. All modeled correlations and path coefficients are significant. AR = affective response; PT = perspective taking; SOA = self-other awareness; AM = affective mentalizing; ER = emotion regulation *p = .014; **p = .002; all other relationships $p < .001$

Appendix G

Loadings: Unstandardized Loadings (Standard Errors), Standardized Loadings in the CFA Model (*N* = 300)

Observed Variables	Unstandardized (Standard Errors)	Standardized*
Affective Response		
1	1.00 (0.00)	.55
7	1.32 (0.21)	.55
11	1.83 (0.34)	.43
16	1.71 (0.24)	.70
21	1.29 (0.19)	.54
Perspective Taking		
4	1.00 (0.00)	.61
6	0.90 (0.13)	.52
13	1.27 (0.14)	.72
15	0.97 (0.11)	.63
19	0.79 (0.12)	.43
Self-Other Awareness		
8	1.00 (0.00)	.66
14	1.19 (0.12)	.73
15	1.10 (0.16)	.53
20	0.77 (0.13)	.43
Affective Mentalizing		
3	1.00 (0.00)	.62
9	1.10 (0.12)	.66
12	1.45 (0.15)	.74
22	1.20 (0.11)	.76
Emotion Regulation		
2	1.00 (0.00)	.64
5	0.72 (0.15)	.46
10	0.77 (0.11)	.51
17	1.18 (0.20)	.69

Note. $\chi^2(199) = 605.41$, $p < .001$

*$p < .001$

Appendix H

Covariances: Unstandardized Loadings (Standard Errors), Standardized Loadings, and Significance Levels in the CFA Model (N = 300)

Covariances	Unstandardized Loadings (Standard Error)	Standardized Loadings	p
ER and AM	0.06 (0.03)	.20	.014
SOA and ER	0.19 (0.04)	.57	< .001
SOA and AM	0.21 (0.03)	.73	< .001
PT and AM	0.26 (0.04)	.91	< .001
PT and ER	0.11 (0.03)	.35	< .001
PT and SOA	0.23 (0.03)	.76	< .001
AR and ER	0.06 (0.02)	.28	.002
AR and SOA	0.06 (0.02)	.31	< .001
AR and PT	0.11 (0.02)	.56	< .001
AR and AM	0.13 (0.02)	.65	< .001

Note. $\chi^2(199) = 605.41$, $p < .001$; AR = affective response; SOA = self-other awareness; PT = perspective taking; AM = affective mentalizing; ER = emotion regulation

Appendix I

Error Variances: Unstandardized Loadings (Standard Errors) and Standardized Loadings in the CFA Model (*N* = 300)

Error Variances	Unstandardized (Standard Errors)	Standardized*
1	0.31 (0.03)	.70
7	0.55 (0.05)	.70
11	1.94 (0.17)	.81
16	0.40 (0.05)	.51
21	0.54 (0.05)	.71
4	0.48 (0.05)	.63
6	0.62 (0.06)	.73
13	0.45 (0.05)	.49
15	0.41 (0.04)	.60
19	0.76 (0.07)	.81
8	0.39 (0.04)	.56
14	0.38 (0.05)	.46
15	0.97 (0.09)	.72
20	0.81 (0.07)	.82
3	0.45 (0.04)	.61
9	0.44 (0.04)	.57
12	0.50 (0.05)	.46
22	0.30 (0.03)	.43
2	0.52 (0.07)	.60
5	0.67 (0.07)	.79
10	0.60 (0.06)	.74
17	0.53 (0.08)	.52
Affective Response	0.13 (0.03)	1.00
Perspective Taking	0.29 (0.06)	1.00
Self-Other Awareness	0.31 (0.06)	1.00
Affective Mentalizing	0.28 (0.05)	1.00
Emotion Regulation	0.35 (0.08)	1.00

Note. $\chi^2(199) = 605.41$, $p < .001$

*$p < .001$

Appendix J

Modification Indices Greater Than 3.84 With Expected Parameter Change

Parameter Item	Estimated Latent Variable	Modified Latent Variable	Modification Indices	EPC
19	PT	ER	28.52	0.38
6	PT	AM	25.79	1.21
1	AR	ER	20.34	0.30
4	PT	AM	20.04	−1.07
13	PT	ER	18.84	−0.29
7	AR	ER	18.00	−0.28
13	PT	AM	16.48	1.00
21	AR	ER	15.26	0.26
19	PT	SOA	14.62	0.46
8	SOA	AR	13.77	−0.25
8	SOA	AM	10.12	−0.31
8	SOA	PT	9.59	−0.38
18	SOA	AR	8.41	0.20
21	AR	SOA	7.83	0.19
19	PT	AM	7.64	−0.66
11	AR	SOA	7.31	−0.18
3	AM	PT	6.75	0.58
22	AM	ER	6.51	0.15
6	PT	ER	6.05	−0.17
6	PT	AR	5.93	0.20
20	SOA	AR	5.89	0.17
15	PT	AM	5.79	−0.57
13	PT	SOA	5.20	−0.26
5	ER	AR	5.11	−0.15
18	SOA	ER	4.77	0.18
12	AM	PT	4.35	−0.45
16	AR	ER	4.34	−0.14
20	SOA	AM	3.96	0.20
4	PT	ER	3.86	0.13

Note. Any modification indices greater than 3.84 "suggest that the overall fit of the model could be significantly improved if the fixed or constrained parameter was freely estimated" (Brown & Moore, 2012, p. 19). MI = modification index; EPC = expected parameter change

Appendix K

Estimated Error Variances and R^2 Values for Each Indicator Variable-Latent Variable Relationship in the CFA Model

Indicator Variable (Latent Variable)	Standard Error	R^2
1 (AR)	0.31	0.30
7 (AR)	0.55	0.30
11 (AR)	1.94	0.19
16 (AR)	0.40	0.49
21 (AR)	0.54	0.29
4 (PT)	0.48	0.37
6 (PT)	0.62	0.27
13 (PT)	0.45	0.51
15 (PT)	0.41	0.40
19 (PT)	0.76	0.19
8 (SOA)	0.39	0.44
14 (SOA)	0.38	0.54
15 (SOA)	0.97	0.28
20 (SOA)	0.81	0.18
3 (AM)	0.45	0.39
9 (AM)	0.44	0.43
12 (AM)	0.50	0.54
22 (AM)	0.30	0.57
2 (ER)	0.52	0.40
5 (ER)	0.67	0.21
10 (ER)	0.60	0.26
17 (ER)	0.53	0.48

Note. An R^2 value ≤ .20 suggests that the observed variable does not adequately describe the factor and should be considered for removal from the model (Hooper et al., 2008). AR = affective response; PT = perspective taking; SOA = self-other awareness; AM = affective mentalizing; ER = emotion regulation